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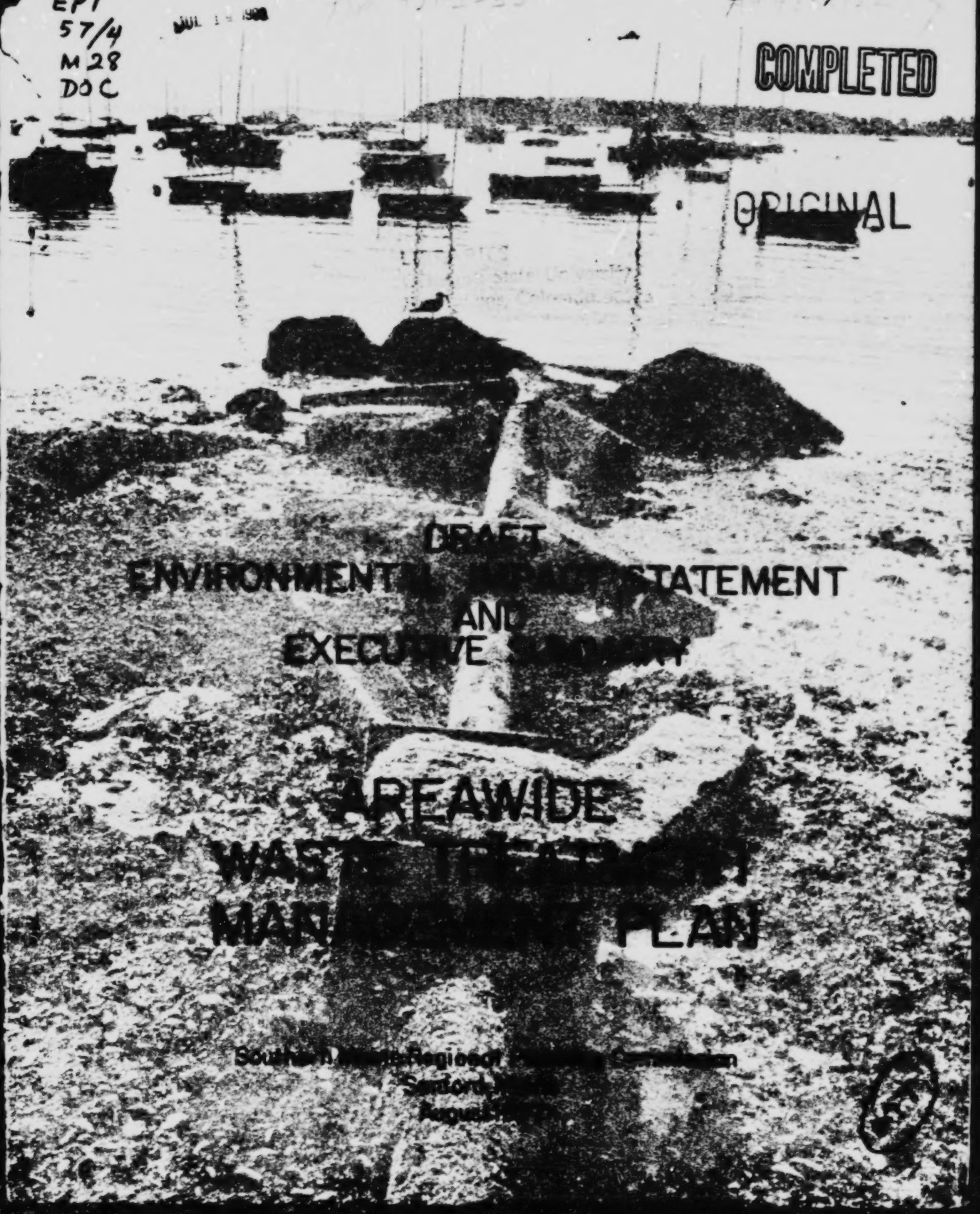

DRAFT ENVIRONMENTAL IMPACT STATEMENT AND EXECUTIVE SUMMARY

AREAWIDE WASTE TREATMENT MANAGEMENT PLAN

Southwest Florida Regional Planning Commission
Sanford, Florida
August [illegible]

DRAFT ENVIRONMENTAL IMPACT STATEMENT

on the

PROPOSED AREAWIDE WASTE TREATMENT MANAGEMENT PLAN

for the

Southern Maine Planning Area

September 1977

Prepared by:

Southern Maine Regional Planning Commission

Sanford, Maine 04073

U. S. Environmental Protection Agency
Region I
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PREFACE

The following Areawide Waste Treatment Management Plan is a product of the cooperative efforts of the Southern Maine Regional Planning Commission, the Maine Department of Environmental Protection (MDEP), and the United States Environmental Protection Agency (EPA), Region I, Boston. It is part of a two year, areawide waste treatment management planning process funded by the EPA as a result of the 1972 Federal Water Quality Act Amendments, Section 208.

This document serves as both a staff report to the Southern Maine Regional Planning Commission and a Draft Environmental Impact Statement. It summarizes the alternative technical and management alternatives that might be used to protect the area's water resources. It indicates the environmental, economic and social impacts of each, both positive and negative.

Staff recommendations are made in the following areas:

Sewage Disposal, Collection and Treatment Systems
Sewage Disposal, Subsurface Systems
Septage Disposal
Sludge Disposal
Solid Waste Disposal
Industrial Waste Disposal
Runoff from Development
Runoff from Agriculture
Runoff from Silviculture
Salt Storage Application
Runoff from Construction Activities
Runoff from Sand and Gravel Extraction
Petroleum Storage Transfer

The purpose of the Draft Environmental Impact Statement is to provide the local officials, the Southern Maine Regional Planning Commission and the general public with a means of evaluating and selecting among proposed actions resulting from the areawide waste treatment management planning process. This is mandated by the National Environmental Policy Act (NEPA) of 1969.

Section 102(2)(c) of the Act requires an Environmental Impact Statement whenever a proposed action will "significantly affect the quality of the human environment". To the extent necessary, the environmental impact statement must address:

1. The environmental impacts of the proposed alternatives,
2. Any adverse environmental affects which cannot be avoided...
3. Alternatives for proper management of waterbodies,
4. The relationship between local short-term uses of man's environment and the maintenance and enhancement of long-term productivity, and
5. Any irreversible or irretrievable commitments of resources which would be involved in the alternatives which have been explored.

Additional copies of this E.I.S. can be reviewed at:

Southern Maine Regional Planning Commission
2 School Street, Box Q
Sanford, Maine

Environmental Protection Agency, Region I
John F. Kennedy Federal Building, Room 2203
Boston, Massachusetts

Public comments on all aspects of the proposed alternatives are invited both at an information meeting, and by mail to the Southern Maine Regional Planning Commission, 2 School Street, Box Q, Sanford, Maine 04073.

This report was prepared by the Southern Maine Regional Planning Commission and the Environmental Protection Agency.

SOUTHERN MAINE REGIONAL PLANNING COMMISSION
AREAWIDE WASTE TREATMENT MANAGEMENT PLAN
DRAFT ENVIRONMENTAL IMPACT STATEMENT

INTRODUCTION

The Southern Maine Regional Planning Commission (SMRPC) has completed a draft of the final report of a two-year program that was instituted in this region through a grant administered by the United States Environmental Protection Agency (EPA) pursuant to Section 208--Areawide Waste Treatment Management Planning, Public Law 92-500, Federal Water Pollution Control Act Amendments of 1972. The Southern Maine Regional Planning Commission (SMRPC) was designated on July 26, 1974 to develop and administer the planning program for this area.

The purpose of Areawide Waste Treatment Management Planning is to develop a coordinated and viable management system capable of organizing, directing, implementing, and maintaining an effective program of water pollution abatement and control. A series of documents has been developed that describe such a management system for the Southern Maine 208 area, including what the water quality problems are in relation to man-induced waste inputs to the area's water resources, the means to control those waste inputs to prevent or correct degradation of surface and groundwater quality in the area in accordance with the requirements of the Federal Water Pollution Control Act of 1972 and applicable Federal/State water quality standards, and the institutional, legal and financial arrangements that are necessary to implement effective management of a comprehensive waste control program.

One of the requirements of the federally funded program is that an adequate environmental assessment be an integral part of a Section 208 Plan submitted by the 208 agency (SMRPC) to EPA for approval. The environmental assessment must comply with the provisions of the National Environmental Policy Act of 1969 (NEPA) and regulations adopted by EPA under NEPA. The National Environmental Policy Act states that the overall goal of an environmental assessment is to:

> "encourage productive and enjoyable harmony between man and his environment; to promote efforts which will prevent or eliminate damage to the environment and biosphere and stimulate the health and welfare of man; to enrich the understanding of the ecological systems and natural resources important to the nation..."

In order to comply with NEPA, the environmental assessment, required as an integral part of the 208 Plan, has been prepared through a joint SMRPC/EPA effort and as such, serves as the Draft Environmental Impact Statement (EIS) regarding the 208 Plan and its acceptance and approval by EPA.

To be an effective tool in the planning process, an environmental assessment must be initiated when the planning process begins. The assessment should develop as the plan develops, analyzing the impact of each major planning decision on physical/chemical, ecological, aesthetic, and social factors affected by the plan. Thus, running concurrently with the formation of the waste treatment management planning process, the environmental assessment acts as a constant monitor of environmental reactions and provides the planner with a guide on which to base his decisions.

SCOPE OF THE ENVIRONMENTAL IMPACT STATEMENT

The SMRPC 208 Plan has developed technical and management recommendations to provide effective controls for the following sources of waste in the 208 area: sewage disposal-collection and treatment systems; sewage disposal-subsurface systems; septage disposal; sludge disposal; solid waste disposal; industrial waste disposal; runoff from development; runoff from agriculture, runoff from silviculture; salt storage and application; runoff from construction activities; runoff from sand and gravel extraction; petroleum storage and transfer; and dredge and disposal operations. These waste sources have been prioritized on an areawide basis according to the magnitude of their actual or potential adverse impact on the water resources of the area; these waste sources have been evaluated and presented on a town by town basis on the summary matrix on page 23. This matrix is the basis for the conter of the EIS.

The high priority indication for a waste source in a particular town is based on major issues that are addressed in the plan. As a major issue, implementation of recommendations are most important for water quality improvement on a short term basis. Similarly, priority and low priority indications are for those issues that are less important in terms of the magnitude of water quality improvement that may be achieved. "No problem" is indicated for those waste sources where no water quality issue has been identified.

For each waste source addressed, technical and management considerations have been presented and analyzed on a town by town basis. The existing and future conditions and alternatives and recommendations have been discussed for the waste source and assessed according to their anticipated impact on the natural and cultural factors of the area.

The Environmental Impact Statement where possible indicates either in quantitative or qualitative terms the impact of proposed alternatives or actions. It should be noted that such an assessment of a long-range general plan (208) is fraught with limitations. The plan in many instances is a guide for future action, study, and assessment. For those water quality problems where structural solutions or non-structural controls are developed or recommended, the level of detail may be sufficient to allow for adequate assessment; however, the availability of data provides a constant constraint on that level of detail. For those issues requiring additional study prior to reaching a final decision on applying specific controls, a general, qualitative assessment has been made. Additionally, the 201 projects that are part of this 208 program are subject to detailed EIS requirements through their own 201 program requirements.

Because of the nature of an EIS, it serves well as a summary to the problems and solutions addressed in the plan. Therefore this document also serves as the Executive Summary of the 208 Plan and constitutes Chapter 7 of the final report. Widespread distribution of the EIS/Executive Summary and its brevity compared to the entire plan facilitatesthe review of 208 Plan content and recommendations by officials and citizens throughout the planning area. For additional detail and supporting information, interested individuals or agencies may refer to the Plan or other reports developed during the 2 year program.

PLANNING AREA

The 208 planning area incorporates within its boundaries the Southern Maine coastal region and an urban-industrial area slightly inland from the coast. Figure 1 shows the location of the Southern Maine 208 area with respect to

New England. Specifically, the 208 area is intrastate and includes the York County municipalities of Saco, Old Orchard Beach, Biddeford, Arundel, Kennebunkport, Kennebunk, Sanford, Wells, York, Kittery, Eliot, and South Berwick. These municipalities are shown on Figure 2, a map of the Southern Maine Planning and Development District. Figure 3 shows more detail of the planning area itself.

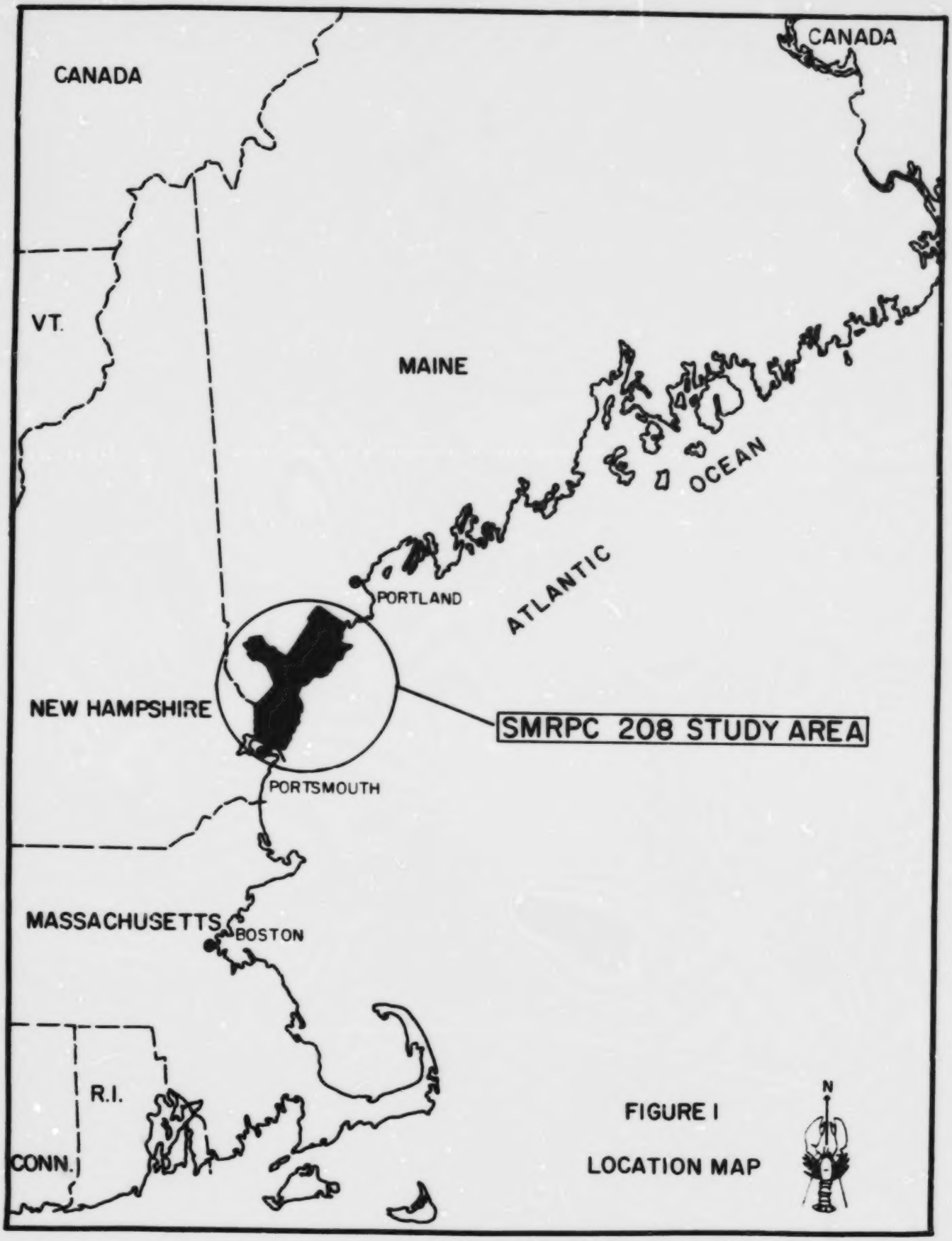


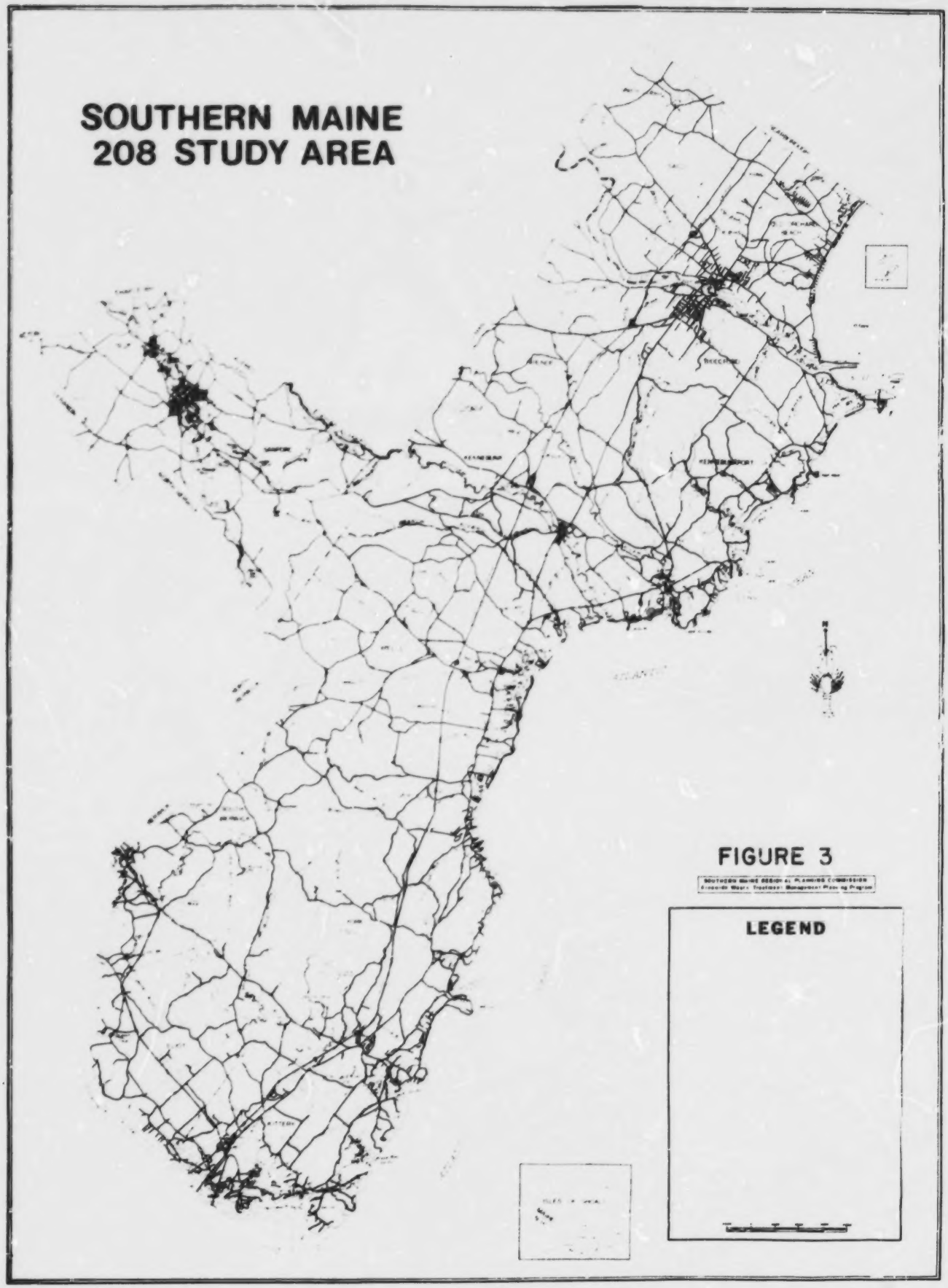
FIGURE I

LOCATION MAP

FIGURE 2

SOUTHERN MAINE PLANNING & DEVELOPMENT DISTRICT

208 PLANNING AREA


SOUTHERN MAINE
208 STUDY AREA
FIGURE 3
LEGEND

NATURAL CHARACTERISTICS

The natural and environmental characteristics of the area that are integral to considerations of water as a resource are described in this section. The interactions between water, as part of the hydrologic cycle, and the earth's surface from the upper strata where vegetation grows to the bedrock, constitude the prime factors in determining resource characteristics and capabilities. Particularly, that part of the cycle where water is running along the surface of the land, percolating into the soil, and moving or flowing through the underlying soils and rock strata is of concern.

Geology

The bedrock geology of the 208 area in Southern Maine is a varied and complex pattern of earlier formations of sedimentary and igneous rock. The sedimentary rock has been altered through intense heat and pressures to form metamorphic rock such as slates, quartzites, schists, and gneisses. Large bodies of igneous rock have pushed their way through or overlain the metamorphic rock. Uplighting of the earth's crust and erosion have further altered the various combinations of rock structures.

In addition to the processes of crust shifting and uplifting, and weathering, the bedrock geology of the area has been modified through extensive continental glaciation. Glaciation tends to smooth over bedrock protrusions and peaks leaving lower hills and ridges. The bedrock surface in the coastal area today is relatively flat, rising gradually to the foothills of the White Mountains, and dissected by numerous streams and rivers that have, for example, carved gorges 20 to 100 feet deep in the granite hills of the Mount Agamenticus-Ogunquit area. What remains of the mountain range in the southern and western portions of the study area are scattered and isolated, rounded, high, smooth, weathered rock hills.

Land Surface Materials/Soils

The weathering and glaciation processes at work on the bedrock of the area have also been responsible for the deposits of loose surface materials and soils that form the "overburden" on the bedrock. Thick deposits of till (material usually deposited from beneath the glacier) have been left throughout most of the area. Outwash plains of sand and gravel, resulting from the melting of the glacier, were deposited over the till. The stream valleys have also received thick accumulations of the water laid materials. When the coastal lowland area was covered by ocean waters and lakes following glaciation, silt and clay materials were deposited. Later uplifts have intermixed the till, outwash, and silt and clay materials in a complex pattern that has been further complicated by post-glacial erosion and sedimentation.

The thickness of this "overburden" of loose material (or depth to bedrock) varies widely over the 208 region, from 0 to 200 feet. Typically, much of the coastal area has a rather shallow thickness of "overburden", approximately 25% as, on the average, 3 feet or less (although it may vary from 0 to 10 feet). The rest of the area has depth to bedrock largely less than 50 feet (approximately 34% as 10 - 20 feet, 22% as 20 - 50 feet, 18% as 50 - 100 feet, 1% as 100 - 200 feet, and much less than 1% as greater than 200 feet in depth).

A predominant characteristic of the soils in the 208 area is the presence of the groundwater table near or at the surface. Of the thirteen major soil types eight exhibit a water table a foot or two near the surface. Other prevalent characteristics of soils in the area are very low permeability, bedrock near the surface, and very rapid permeability. All are important in relation to water quality.

Topography

The topography of the 208 region, defined as the physical features or form of the land (combination of the bedrock formations and overburden of surface materials and soils) in terms of hills, valleys, plains, etc. is generally of the nature of a coastal plain. The coastal plain is relatively flat along the immediate coast rising to minor hills and ridges further inland.

The northern section of the 208 area is comprised of a few scattered, gently sloping hills of up to 200 feet in elevation that lead to low, flat areas 20 to 60 feet in elevation along the coast. The central section of the area, starting from northwestern Sanford, begins with several hills and ridges at 500-600 feet, dropping to flat areas of 200 to 250 feet elevation in eastern Sanford, and then to flat areas ranging from 20 to 100 feet in elevation along the coast. Between the central section of the area and the southernmost low, flat area (20 to 80 feet in elevation) in Kittery, lies the most prominent feature of the region, Mt. Agamenticus, at an elevation of 673 feet (approximately 6 miles inland). Much of the area around Mt. Agamenticus is gently rolling, with small rounded, moderately sloping hills.

Land Cover

The predominant land cover type in the 208 region is forest, comprising 69.1% of the total area. Slightly more than half of the forested areas are hardwoods, principally of the maple, beech, and birch or aspen and birch growths. The remainder is softwood, with red and white pine as the major growth. Other common tree species include hemlock, oak, pitch pine, spruce, and fir. The forests provide a major contribution to the environment by supplying cover for water production, wildlife, shrub, and plant life.

Another major category of land cover can be described generally as open areas, including forested areas cleared by timber harvesting, cleared for agricultural, highway, and transmission line use, and non-forested areas used for excavation (quarries and gravel pits). These types of open or cleared areas are scattered widely throughout the region, and together account for 15.2% of the land cover of the region. The cleared areas are significant in terms of providing open space and varied vegetative cover that contributes to diversity of wildlife and plant life eco-systems. Additionally, much of the cleared area is important to food production for the region including, dairy, poultry, apple orchards, blueberries, vegetables, and small fruits.

Wetlands, including coastal marsh, swamps, and peat deposits, constitute 5.7% of the region's land cover. Inland wetlands are areas that are poorly drained or where the groundwater table is at or very near the surface much of the year. Wetlands provide important habitat for a variety of wildlife and plant life and are often in close proximity to lakes or streams forming unique and sensitive ecosystems. The numerous wetland areas in the region also are a source of an extensive mosquito population during summer months. There are several peat deposits in the region with a major, commercially important deposit in Saco.

The coastal marshes are the interface between inland freshwaters (groundwater and surface waters) and the ocean's saltwater. Marsh growth occurs along the shore in nearly all tidal areas where flats are exposed during low tide. The largest marsh areas are the York River marshes, Wells, Branch Brook, Mousam River, Kennebunk River, Batson River, Little River, and Biddeford Pool marshes. These coastal marshes, including the interstate Piscataqua River marshes are probably the most important coastal marshes in Maine.

Tidal marshes are critically important because the tidal channels which dissect them provide the essential spawning and nursery grounds for such important species of fish as the menhaden, striped bass, bluefish, and flounder, which as adults, feed in deeper waters. They also provide essential stopping and feeding places for migratory waterfowl, and are important components of the food chain for fish and shellfish.

The final major category of land cover is the developed areas, including residential, commercial, and industrial development. Residential development includes scattered single family homes in the rural portions of a town to the densely built up development in the urban or village areas. Commercial and industrial development include land used for manufacturing industries, industrial parks, shopping centers, and concentrated areas of small business interests. Together, these developed areas comprise 10% of the total 208 area.

The developed areas contribute very little or nothing to the natural environment of the region in terms of habitat, food production, or resource protection and management. Such development, often times, is in conflict with the natural components of the environment, particularly if development is located improperly with respect to the capabilities of the environment to adequately withstand the changes rendered by development.

Watershed Hydrology

Precipitation that falls to the land surface is divided into 3 basic components: water that percolates through the soil to the groundwater table; water that remains on the land surface and runs off; and water that returns to the vapor phase through evaporation and transpiration through vegetation. Watershed hydrology concerns itself primarily with the water that remains either on the land surface or beneath the surface as groundwater.

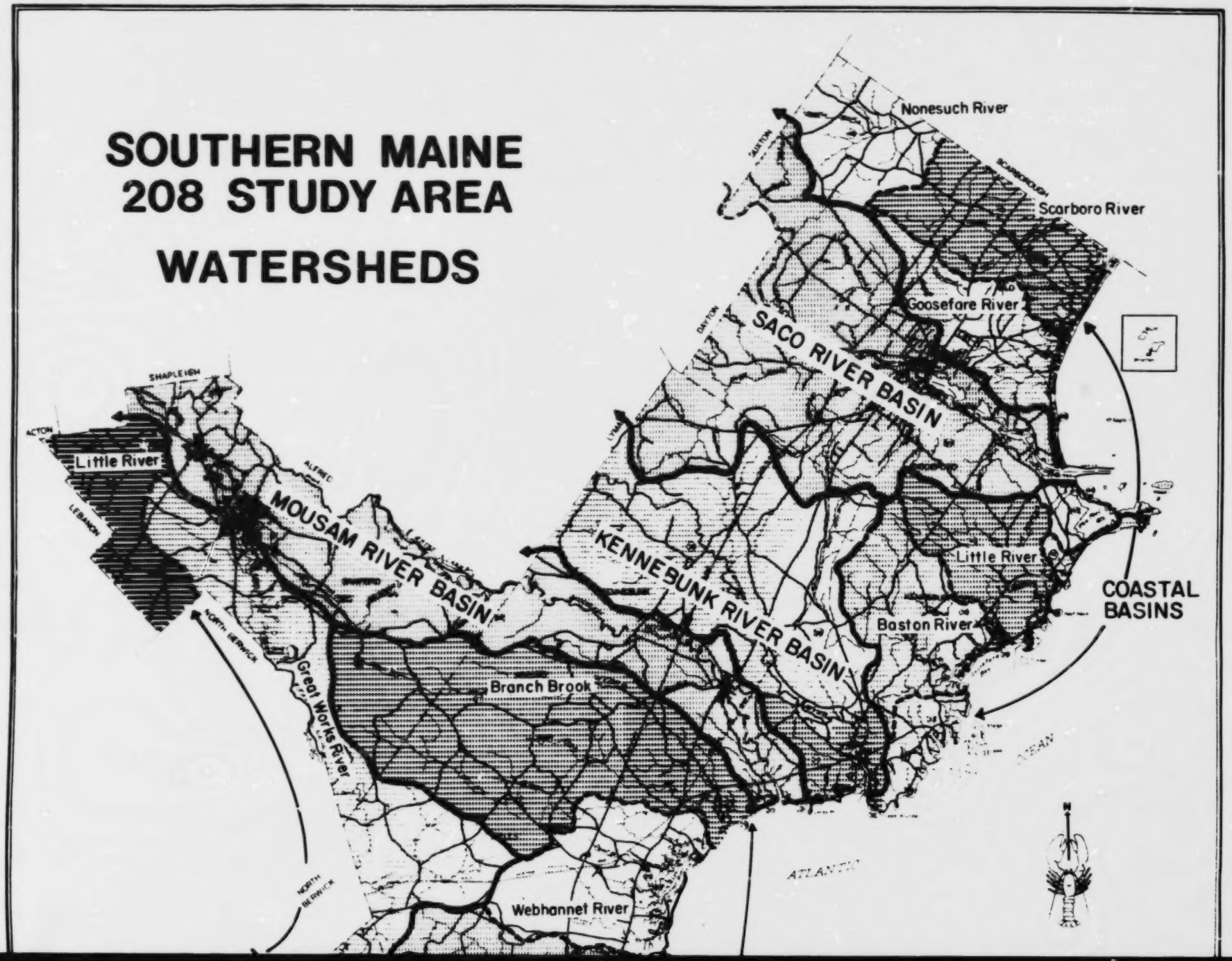
Surface runoff is defined by the topography of the land surface; the water always drains to the lowest point possible because of gravitational influences, this point being the ocean in the 208 area. The system of water drainage channels used by run-off waters, varying from very small brooks to larger rivers, generally are in a southeasterly direction towards the Atlantic Ocean, but tributaries naturally flow from all directions into the larger channels. Low areas in the topography may result in a surface drainage impoundment, forming the ponds and lakes.

Groundwater flows also tend to follow the topography of the land to the extent that this water also seeks the low areas of the land. Typically, groundwater moves slowly through the soils and fractures in bedrock toward the topographic lows represented by lakes, swamps, and stream valleys. Thus, in addition to surface run-off, groundwater may be a source of water for the lakes and streams. In other surface formations where the level of the groundwater (groundwater table) intersects the land surface, springs develop.

Where the topography of an area may provide distinct boundaries for a surface drainage system, such boundaries to not necessarily apply to the groundwater regime. Groundwater flows and their directions are also dependent on the subsurface materials and in particular, the permeability of those materials. For example, if a drainage divide (hill or ridge) is underlain by a highly permeable water bearing strata, the groundwater system may be common to what are the separate surface drainage systems.

The largest quantities of surface runoff occur during March, April, and May, with the lowest occurring in August and September. On the average, approximately 22 inches of the 44 inches annual precipitation occurs as runoff. The combination of spring rains and snow melt in the spring not only serve to greatly increase stream flows, but also tend to replenish groundwater supplies. During winter when most precipitation is snow, and in summer with high evapotranspiration rates, little water is percolating through the soils; thus groundwater flows can vary considerably from season to season with the highest groundwater table in early to mid-spring

In the 208 area, a significant portion (48%) of the surface runoff is drained by coastal basins that are small drainage basins reaching a short distance inland from the coast. The remainder of the area is drained by larger river drainage basins that reach further inland. The Saco River basin and the Piscataqua-Salmon Falls River basin are the largest drainage systems, the Mousam and Kennebunk Rivers being considerably smaller. Figure 4 delineates all of the major and minor drainage systems or watersheds within the 208 area. Watershed boundaries have been inputed to the data management system, and watershed areas computed. The watersheds have been numbered for identification purposes. Table I correlates the watershed identification number with the names of the better known rivers and brooks and the respective area within the planning area drained by those rivers.


SOUTHERN MAINE
208 STUDY AREA
WATERSHEDS
Nonesuch River
Scarboro River
Goosefare River
SACO RIVER BASIN
SHAPLEIGH
ACTON
Little River
LEBANON
ALFRED
MOUSAM RIVER BASIN
KENNEBUNK RIVER BASIN
Little River
Boston River
COASTAL
BASINS
NORTH BERWICK
Great Works River
Branch Brook
Webhannet River
ATLANTIC
OCEAN
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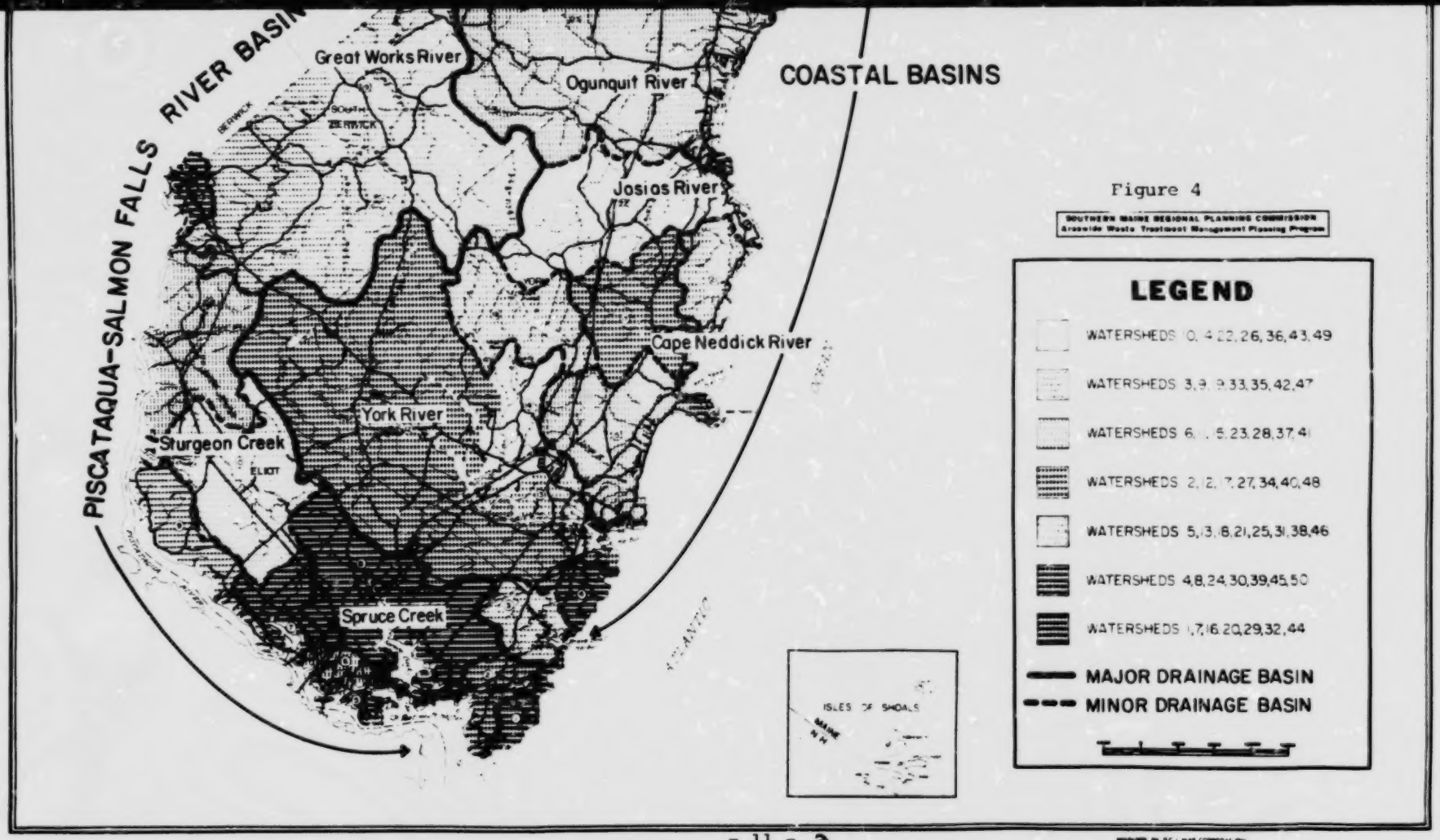


Figure 4

SOUTHERN MAINE REGIONAL PLANNING COMMISSION
Areawide Waste Treatment Management Planning Program

Table 1

Area of Watersheds

Major Drainage Basins	Watershed Identification Number	Watershed Area Within 208 Region (Square Miles)
Saco River Basin	37	42.41
Kennebunk River Basin	34,35,36	35.42
Mousam River Basin	28	34.62
Piscataqua - Salmon Falls River Basin		
1. Spruce Creek	8	8.51
2. Sturgeon Creek	10	7.59
3. Great Works River	19	47.79
4. Little River	50	8.34
5. Other	2,5,6,7 9,11,20	14.86
Coastal Basins		
1. York River	12,13,14	30.01
2. Cape Neddick River	17	4.52
3. Josias River	22	8.95
4. Ogunquit River	23	20.21
5. Webhannet River	26	13.53
6. Branch Brook	27	32.88
7. Batson River	38	10.53
8. Little River	40	8.77
9. Goosefare Brook	47	8.98
10. Other	1,3,4,15,16,18, 21,24,25,29,30 31,32,39,41,42, 43,44,45,46,48, 49	45.68

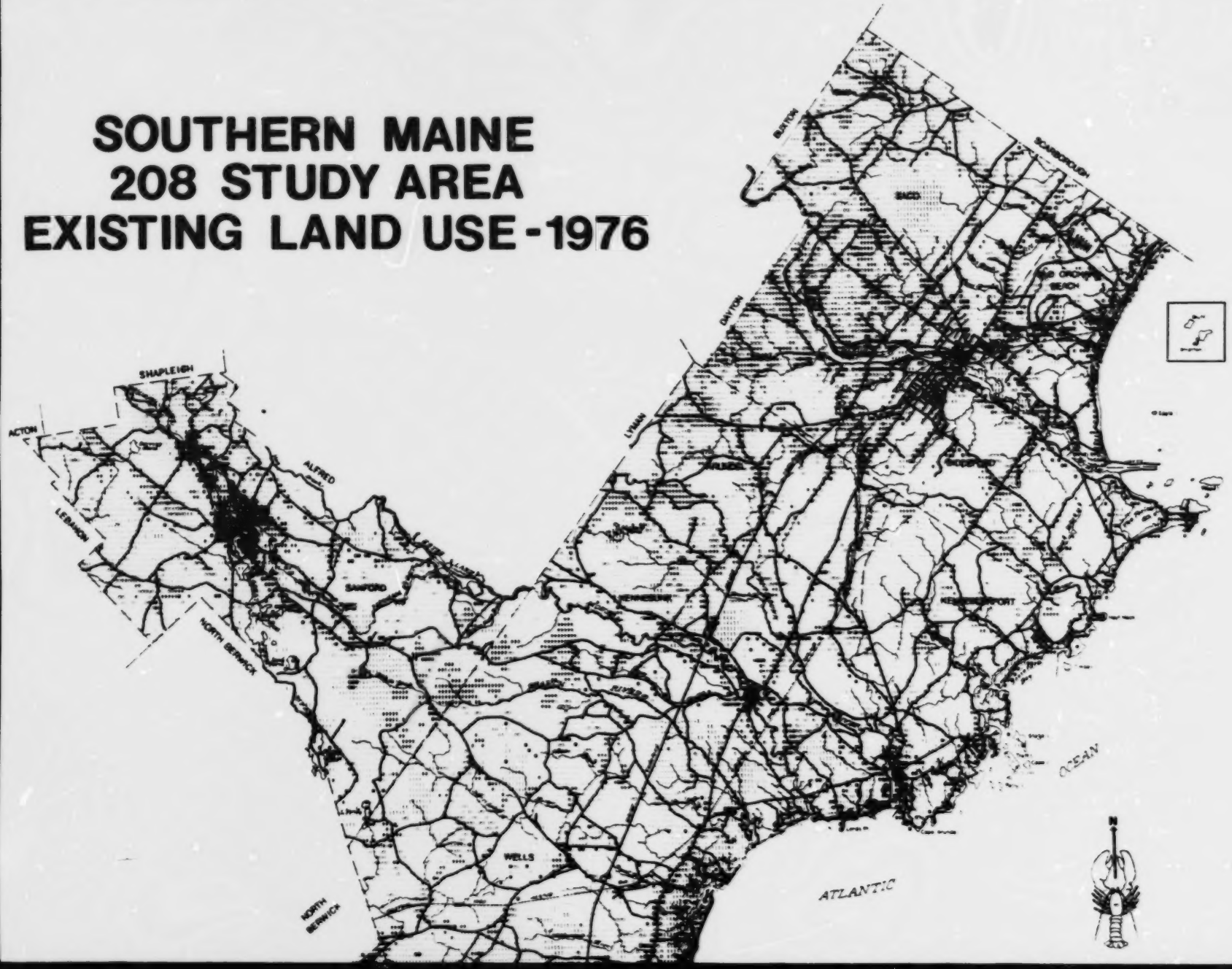
CULTURAL CHARACTERISTICS

Land Use/Land Cover

The land use/land cover of the Southern Maine Study area is presented on Figure 5 and summarized on Table 2. The land use/land cover of the study area has been utilized to locate the source of point and non-point pollution reaching the area's waters. Point sources of pollution are found predominately in the areas identified as commercial, industrial and urban residential. Comprising approximately 3.8% of the land in the study area, these intense land uses encompass most of the industrial and municipal wastewater discharges to streams. In addition to point source discharges, stormwater runoff from the urbanized areas is much higher in contaminent concentrations than in rural areas.

The major sources of water pollution generated by rural land uses are those associated with rural residential, agricultural and mining land uses. Malfunctioning subsurface waste disposal systems have been identified as the source of localized groundwater contamination in some rural parts of the study area. Agricultural runoff is not a major source of pollution in this area because of the small percentage of land in agricultural use, 4% and the high percentage of farms with conservation plans (66%). Other potential sources such as mining and timber harvesting are also minor sources of water pollution as compared to urban sources.

SOUTHERN MAINE 208 STUDY AREA EXISTING LAND USE - 1976



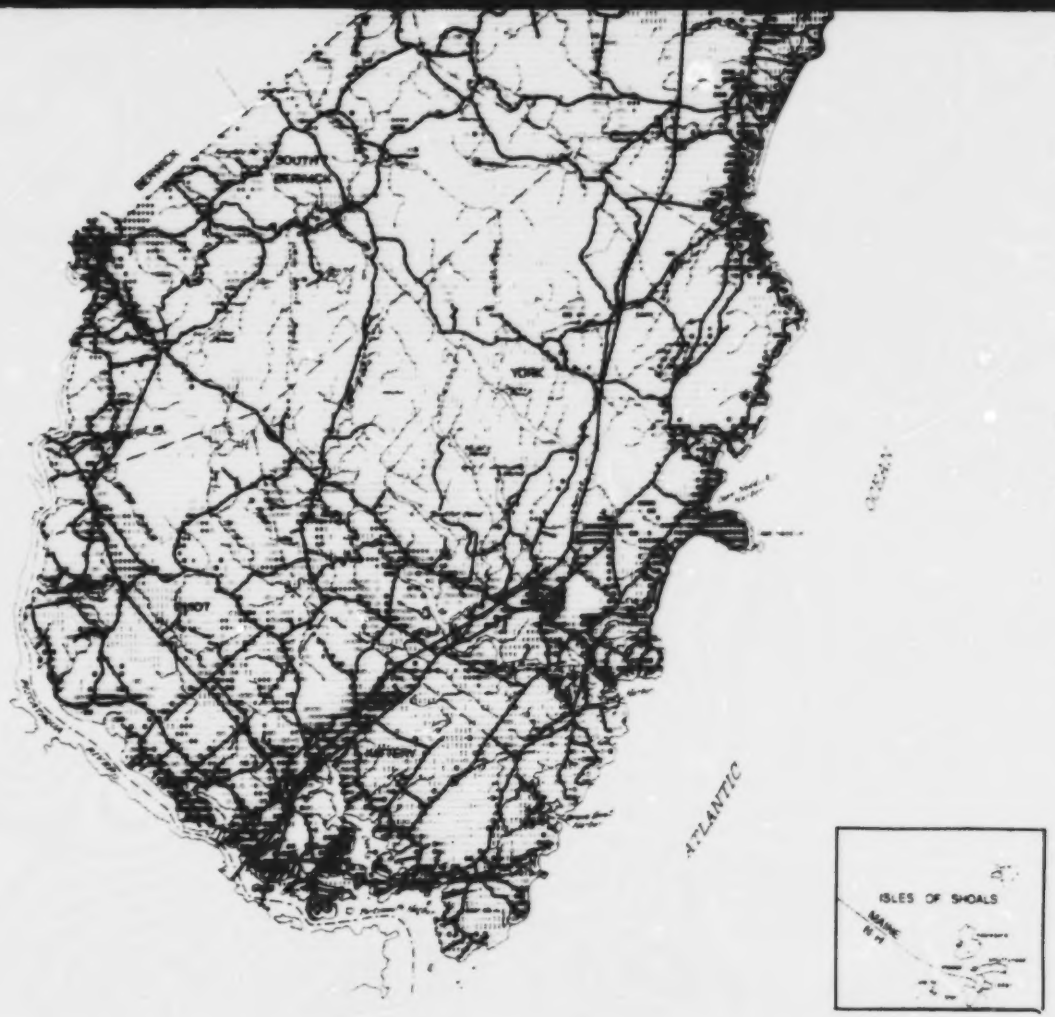


Figure 5

SOUTHERN MAINE REGIONAL PLANNING COMMISSION
Areawide Waste Treatment Management Planning Program

LEGEND

LAND USE	SQUARE MILES	PERCENT OF THE AREA
PREDOMINATELY HARDWOOD FOREST	156	39.9
PREDOMINATELY SOFTWOOD FOREST	114	29.2
OPEN FIELD & CLEARCUT	34	8.9
SCARRED (QUARRIES, GRAVEL PITS)	5	1.3
AGRICULTURE	16	4.0
TRANSMISSION LINES	4	1.0
WETLANDS	22	5.7
PUBLIC & SEMI PUBLIC	7	1.9
RURAL & LOW DENSITY RESIDENTIAL	16	4.3
URBAN & HIGH DENSITY RESIDENTIAL	9	2.4
TRAILER & MOBILE HOME PARKS		0.4
COMMERCIAL & INDUSTRIAL	4	1.0
TOTAL	389	100.0

Table 2

208 STUDY AREA

EXISTING LAND USE - 1976

Land Use	Acres	Square Miles	Percent of the Area
Predominately Hardwood Forest	99,000	156	39.9
Predominately Softwood Forest	73,000	114	29.2
Open Field and Clearcut	22,000	34	8.9
Scarred (quarries, gravel pits)	3,000	5	1.3
Agriculture	10,000	16	4.0
Transmission Lines	2,500	4	1.0
Wetlands	14,000	22	5.7
Public and Semi-Public	5,000	7	1.9
Rural and Low Density Residential	10,000	16	4.3
Urban and High Density Residential	6,000	9	2.4
Trailer and Mobile Home Parks	1,000	1	0.4
Commercial and Industrial	2,500	4	1.0
Total	248,000	388	100.00

POPULATION CHARACTERISTICS*

Vital Statistics: The study area population rose from 79,000 persons in 1940 to 103,000 in 1975 and is projected to increase to 156,000 by 2000. During the past decade, two-thirds of the areas population rise resulted from "natural increase" (births minus deaths) and one-third from net in-migration. The future growth of the study area will be determined partly by economic pressures in the surrounding area ... particularly in the counties north of Boston.

The population density of the study area ranges from .33 acres/person in five urban areas to more than 10 acres/person in the majority of the study area. (See Table 3.) The population density of the region averages only 250 persons per square mile, and the five urban areas of Old Orchard Beach, Biddeford, Saco, Sanford and Kittery have densities exceeding 1,000 persons per square mile. The population of this area doubles in the summer.

*Source: Population Projections; SMRPC, April, 1976.

Although females outnumber males, it is expected that by 2000, there will be more males than females because of an estimated influx of new workers (mostly males).

Social Characteristics: There has been no significant change in the mobility of Southern Maine's population between 1960 and 1970. The number of adults who completed high school rose 41% during the decade, while college graduates increased 65%. The largest numerical increases in school enrollment occurred at the high school level, although college enrollment rose faster.

Seasonal Population: It has been estimated that the peak seasonal population of the 208 study area doubles during the summer. This estimate was prepared by the Maine Department of Health and Welfare from the U. S. Census of 1970. Seasonal homes account for 50% of the increase while campgrounds and commercial lodgings account for approximately 25% each. This influx of over an average of 100,000 people per day over the summer adds to the waste disposal facility needs for that period. Solid waste, sewage, sludge and septage double during the months of July and August, thus requiring adequate facilities for their disposal.

Table 3

POPULATION PROJECTION

	1980	1985	1990	1995	2000
Arundel	2,293	2,545	2,774	2,968	3,116
Biddeford	25,273	26,110	26,972	27,862	28,781
Eliot	4,827	5,358	5,840	6,249	6,561
Kennebunk	7,806	8,665	9,445	10,106	10,611
Kennebunkport	3,263	3,622	3,948	4,224	4,435
Kittery	13,822	14,209	14,607	15,106	15,436
Old Orchard Beach	6,436	7,067	7,760	8,520	9,355
Saco	13,908	14,993	16,162	17,423	18,782
Sanford	18,832	20,339	21,966	23,723	25,620
South Berwick	4,631	5,140	5,603	5,995	6,295
Wells	8,037	8,921	9,724	10,405	10,925
York	9,345	10,373	11,307	12,098	12,703
	118,473	127,340	136,108	144,589	152,620

Sewer Service Systems

Sewage collection and treatment facilities have been constructed throughout the 208 region. Sewer facilities in the larger urban areas date back to the beginning of this century and earlier. Figure 6 illustrates the extent of the sewer systems and the types of facilities treating the waste collected by the sewer systems. These service areas encompass a majority of the principal urban or village areas throughout the region. Approximately 52% of the population in the region is served by the systems (See Table 4), with this percentage increasing slightly as the new Wells collection and treatment system becomes operational.

While there may be several smaller areas presently requiring sewer service to eliminate water pollution problems associated with direct untreated sewage discharges or failing septic systems, once the Wells system is on the line, there will not be a need for development of any new major sewage collection systems. Growth and development in the region will largely occur near or within the existing service areas, thus requiring moderate and gradual expansion of the sewer service areas. Exceptions to this may be the Camp Ellis, Saco area, Biddeford Pool, and Gooserocks Beach, Kennebunkport areas, that are relatively distant from existing sewer service areas.

Principal efforts in facility development for the region are being directed at upgrading existing inadequate facilities. Federal law mandates, and local water quality objectives support, that existing primary treatment facilities be upgraded to provide secondary treatment. Several of the existing secondary treatment plants require improvements to provide adequate levels of treatment. Old sewer systems in Biddeford, Saco, and Sanford are in need of extensive rehabilitation to eliminate inflow and infiltration problems.

Most of the large industries of the area are connected to the municipal collection and treatment systems. With the exception of the Navy Yard in Kittery, the industries are primarily located in Sanford, Saco, and Biddeford, Maremont Corporation in Saco is the largest industrial facility with its own treatment facility discharging to Goosefare Brook.

A detailed discussion of the status of facility development in each municipality is found in Chapter II, Point Source Controls.

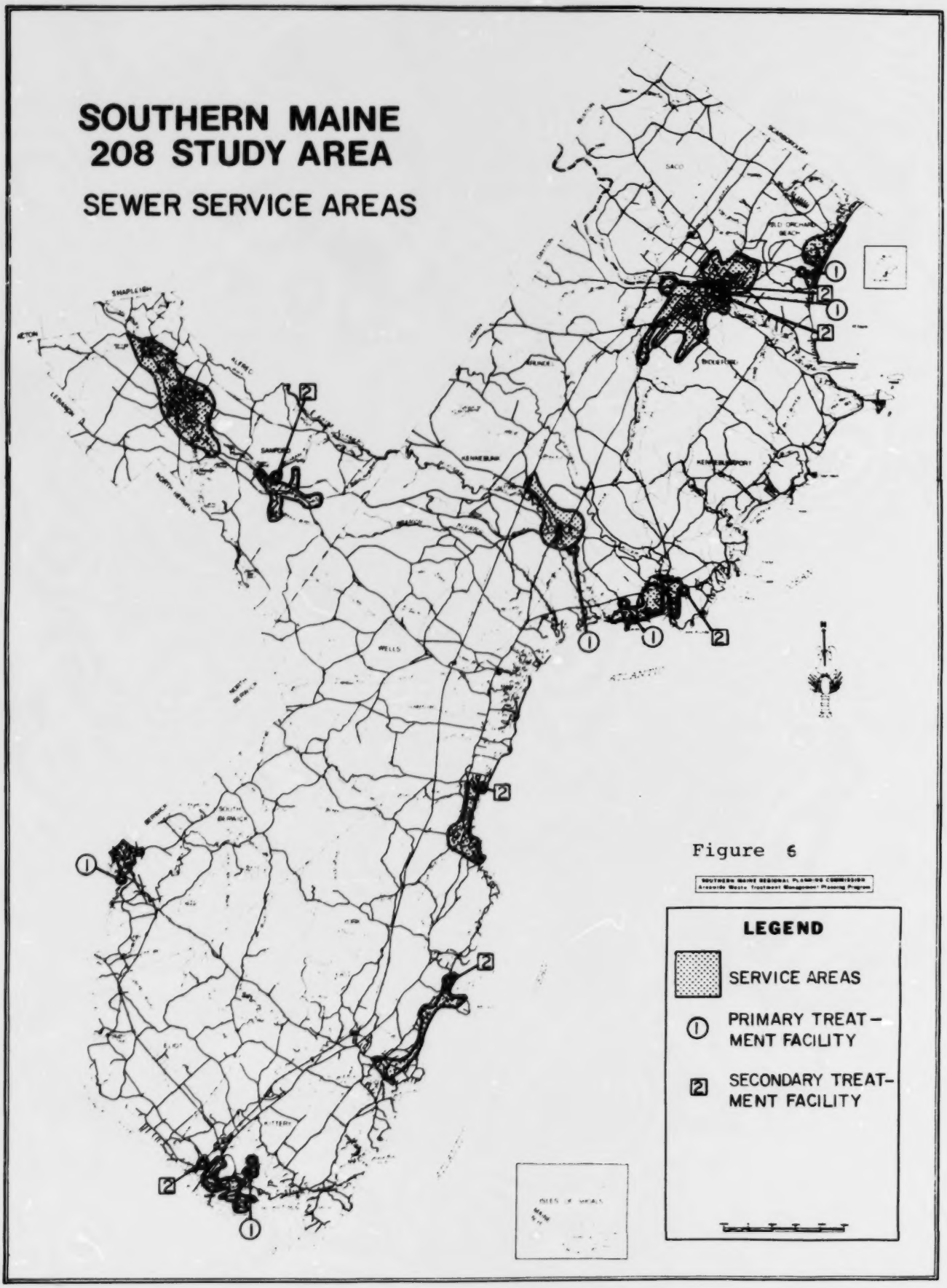

SOUTHERN MAINE
208 STUDY AREA
SEWER SERVICE AREAS
LEGEND
SERVICE AREAS
PRIMARY TREATMENT FACILITY
SECONDARY TREATMENT FACILITY

Figure 6

Table 4

Sewer Service Areas 1977

Population Served

Municipality	Year Round Sewered Population	Percent*	Year Round Total Population (1975 est.)
Old Orchard Beach	4,800	80%	6,014
Saco	8,000	61%	13,120
Biddeford	12,000	57%	21,220
Arundel	0	0	1,925
Kennebunkport	1,000	36%	2,740
Kennebunk	3,500	53%	6,554
Sanford	15,000	80%	18,682
Wells**	0	0	6,052
(Ogunquit)	1,600	26%	
York	3,000	43%	7,037
Kittery	3,100	27%	11,605
Eliot	0	0	4,053
South Berwick	2,000	51%	3,888
Total	54,000	52%	102,890

*Percentage of total population, including Ogunquit Village and Wells.
**The Wells sewage collection and treatment system is under construction.

THE SOUTHERN MAINE AREAWIDE WASTE TREATMENT MANAGEMENT PLAN

Water as a resource is a necessary part of human, plant, and animal life cycles; a source of man's recreation and navigation; an integral part of industrial and agricultural activities, and a carrier and assimilator of waste materials. As a carrier and assimilator of waste materials, water more often than not tends to lose value as a resource for other uses. Particularly, quality of the water resources is diminished, and diminished water quality tends to preclude safe use of water for human, plant, and animal life cycles and contact recreation.

Areawide Waste Treatment Management planning provides the means to develop a level of control and management of waste materials that contribute to deterioriation of water resources. Control and management of these waste materials should be at a level that allows broad utilization of available water resources without deterioration of water quality. Implicit in determining this level of control is the prioritization of the potential uses of water resources. Assimilation of waste materials as a use must have lowest priority in the overall balance of water resource uses.

The Southern Maine 208 area has been faced with complex water quality problems because of a lack of priorities and guidance for the uses of its water resources. Yet, water quality is closely tied to the economic, social and physical well-being of the inhabitants of the region. There is a highly developed recreational industry along the coast that is dependent on good water quality; there is a growing industrial base that requires large quantities of water; there is an established fin and shell-fishing industry that is dependent on good water quality; and there is a fast-growing residential population that needs quality water supplies.

This Areawide Waste Treatment Management Plan, or more commonly, 208 Plan, does not directly address the need to balance these competing uses. However, the plan does describe the methods to control the waste materials created by human activity or wastes associated incidently with these competing uses. Structural means (e.g., treatment facilities) and nonstructural means (e.g., land use regulation) have been welded into a comprehensive program that, upon implementation, will provide a level of control of waste materials that will prevent deterioration of existing high water quality, and restore degraded water quality to a level appropriate for water supply use, protection and propagation of fish, shellfish, and wildlife, and contact recreation.

Although the 208 plan itself does not provide the means to balance competing uses of water resources, the prerogative does exist for the inhabitants of the region to establish priorities and provide guidance for growth, development, and other activities that relate to water quality. The individual municipalities must match their goals for growth, development, and overall "quality of life" with their town's and region's natural resources capabilities to support such growth and development without detriment. Implementation of this plan's recommendations in conjunction with existing municipal programs will go far towards accommodating desired growth and development in the region.

Continued interaction between this planning agency and the municipal organizations, boards, and officials of the area is the principal means by which many of the plan's recommendations will be translated and implemented through existing or new municipal programs. Public participation during the two year planning program, and SMRPC's established working relationship with the municipalities form the basis of effective and coordinated implementation of the plan, and a continuing planning program.

Components of the Plan

The 208 Plan is divided into 7 major components to facilitate use of the plan as a reference document: Introduction and Areawide Assessment, Chapter I; Point Source Control, Chapter 2; Non Point Source Control, Chapter 3; Land Use Analysis, Chapter 4; Management of Waste Treatment, Chapter 5; Public Participation, Chapter 6; and Executive Summary/Environmental Impact Statement, Chapter 7. The plan is bound in a looseleaf binder format to allow easy access to any portion of the plan for reproduction purposes, for future revisions or updating obsolete information, and for compiling information from several sections for one municipality. With the inventory information, description of existing technologies of pollution abatement, and legal and financial information throughout these documents, the plan can serve as a useful reference tool for those interested in water pollution abatement.

The following is a description of the individual chapters of the plan:

Chapter 1 Introduction and Areawide Assessment

This chapter is intended to provide an introduction to what the 208 plan is and a framework with which to view the remaining chapters of the plan. The Areawide Assessment is a generalized description of the planning area including the natural characteristics and the cultural characteristics and their essential inter-relationship of concern in this study; namely, the waste materials generated by the existing culture (and projected for the next 20 years) and the capacity of the natural systems to withstand them.

Additionally this chapter includes: extensive discussions on relating costs and benefits of water pollution control to affected groups, the water users; discussions on two major uses of water in the region, recreation and water supply, and their relationship to water quality; a presentation of a modeling program for the Saco River, individually addressed because of its importance as the major river system of the region and its potential use as a water supply for most of Southern Maine; and the water quality data gathered as part of the 208 program in cooperation with the Maine Department of Environmental Protection.

Chapter 2 Point Source Control

This chapter includes analysis of point sources of water pollution: sewage collection and treatment systems; urban stormwater and combined sewer bypasses and overflows; and private and industrial discharges. Analysis involves description and evaluation of existing systems, projection of future needs for such systems, and alternatives to meet present and future needs. Water quality constraints upon discharges from these point sources are identified using existing water quality data.

Structural controls are the primary methods applied in this section, although not exclusively. Often times, where existing pollution problems exist, application of structural controls (treatment facilities) may be the only effective means of mitigating such problems. However, where applicable, recommendations for nonstructural measures are presented.

Chapter 3 Non Point Source Control

A variety of non-point sources are evaluated in this chapter. The major waste disposal problems are thoroughly evaluated in the sections on Subsurface Sewage Disposal, Septage and Sewage Treatment Plant Sludge Disposal, and Solid Waste

Disposal. The minor non-point sources of erosion, sedimentation, and runoff, highway de-icing salt application and storage, and petroleum pollution are addressed less thoroughly.

The Non Point Source Controls evaluated for application to this region are combinations of nonstructural and structural techniques. While many waste disposal activities require physical facilities for effective disposal, those facilities must be located and used properly. Activities not directly associated with waste disposal, such as agricultural runoff, are dealt with in both this chapter and Chapter 4, Land Use Analysis, in the section on Performance Standards.

Chapter 4 Land Use Analysis

The Land Use Analysis serves to provide a framework for projecting growth and development in the region to relate to waste loads for the next 20 years, and to evaluate the effectiveness of municipal plans and regulatory tools to control land use in the region. Specific recommendations are presented for improving and supplementing ordinances and municipal programs to meet the water quality objectives of this plan.

The recommendations in this chapter constitute an important element in the entire waste management program for the region by providing suitable controls that can and should be applied at the local level rather than at the State or Federal level for managing land use induced water quality effects.

Chapter 5 Management of Areawide Waste Treatment

Chapter 5 examines the existing institutional and legal arrangements for their suitability in managing a comprehensive pollution abatement program and evaluates potential institutional-legal arrangements that may be useful in areawide management. Included, also, is a detailed listing of laws and programs that may serve a purpose in water pollution control. To the extent possible, financial requirements for the waste control program are delineated.

The management system recommended for the 208 area is described and related implementation activities specified. This section ties together all of the technical and management elements of the program into a coherent, comprehensive package that should lead to more effective waste control throughout the region as all of the participants in the water pollution control area implement their respective, recommended actions. The plan's utility and effectiveness to a large degree, rest with the reception of this chapter by the federal, state, and local governments.

Chapter 6 Public Participation

The public participation process that is an integral part of the 208 program is described in this chapter. Included are subcommittee meeting minutes, radio spots, and other activities to illustrate how the public provided input into the plan and how the 208 program disseminated information to interested citizens.

Chapter 7 Executive Summary/Environmental Impact Statement

This chapter serves as a summary of the overall plan for widespread distribution and illustration of the major recommendations of the 208 plan. At the same time, the summary contains the basic elements of an Environmental Impact Statement to satisfy requirements of the National Environmental Policy Act. Alternatives are delineated for the major problems of the region, and described on a town by town basis. Estimated costs and probable environmental impacts of the proposed alternatives are presented.

AUTHORITY → / WASTE SOURCES ↘	OLD ORCHARD BEACH	SACO	BIDDEFORD	ARUNDEL	SANFORD	KENNEBUNK-PORT	KENNEBUNK	WELLS	OGUNQUIT	YORK	KITTERY	ELIOT	SOUTH BERWICK
Sewage Disposal Collection and treatment systems	◉	●	●		●	●	●		◉	⊕	●	●	●
Sewage Disposal Subsurface system	⊕	●	◉		◉	◉	◉	⊕	⊕	◉	◉	⊕	●
Septage Disposal		⊕	◉					◉			⊕	⊕	⊕
Sludge Disposal		●	◉			◉	◉	◉					◉
Solid Waste Disposal	●	●	●	⊕	◉	◉	⊕	◉		◉	◉	◉	◉
Industrial Waste disposal		●	⊕		◉		⊕						
Runoff from development	◉	◉	◉		●		⊕		⊕	⊕	⊕		⊕
Runoff from agriculture		⊕	⊕	⊕	⊕		⊕			⊕	⊕	⊕	⊕
Runoff from silviculture													
Salt storage application	⊕	⊕	⊕	⊕	⊕	⊕	⊕	⊕	⊕	⊕	⊕	⊕	⊕
Runoff from construction activities	⊕	⊕	⊕	⊕	⊕	⊕	⊕	⊕	⊕	⊕	⊕	⊕	⊕
Runoff from sand and gravel extraction													
Petroleum storage transfer	⊕	⊕	⊕	⊕	⊕	⊕	⊕	⊕	⊕	⊕	⊕	⊕	⊕

● High Priority ◉ Priority ⊕ Low Priority ▭ No Problem

OLD ORCHARD BEACH

WASTE SOURCES ADDRESSED	PRIORITY*
SEWAGE DISPOSAL - COLLECTION AND TREATMENT SYSTEMS	◑
SEWAGE DISPOSAL - SUBSURFACE SYSTEMS	⊕
SOLID WASTE DISPOSAL	●
RUNOFF FROM DEVELOPMENT	◉
SALT STORAGE AND APPLICATION	⊕
RUNOFF FROM CONSTRUCTION ACTIVITIES	⊕
PETROLEUM STORAGE AND TRANSFER	⊕

Sewage Disposal Collection and Treatment System

A. Technical Considerations

1. Existing and Future Conditions

Separate sanitary sewers, combined sewers, and storm sewers exist within the Town of Old Orchard Beach. There are presently 20 miles of separate sanitary sewers, 4.5 miles of combined sewers, and approximately 3 miles of storm sewers. Many of the sewers were constructed in the early 1900's of vitrified clay pipe with oakum mortar joints. Asbestos cement pipe has been used in more recent sewer construction. About 75 percent of the Town's estimated 6,300 permanent residents are served by wastewater collection facilities, whereas the population served rises to 25,000 or more during the summer months. Peak summer population including day visitors, has been reported to be as high as 100,000. The existing primary plant has been expanded and upgraded to secondary treatment. Plans for phased construction or replacement of major trunk sewers, storm sewers and catch basins have also been developed.

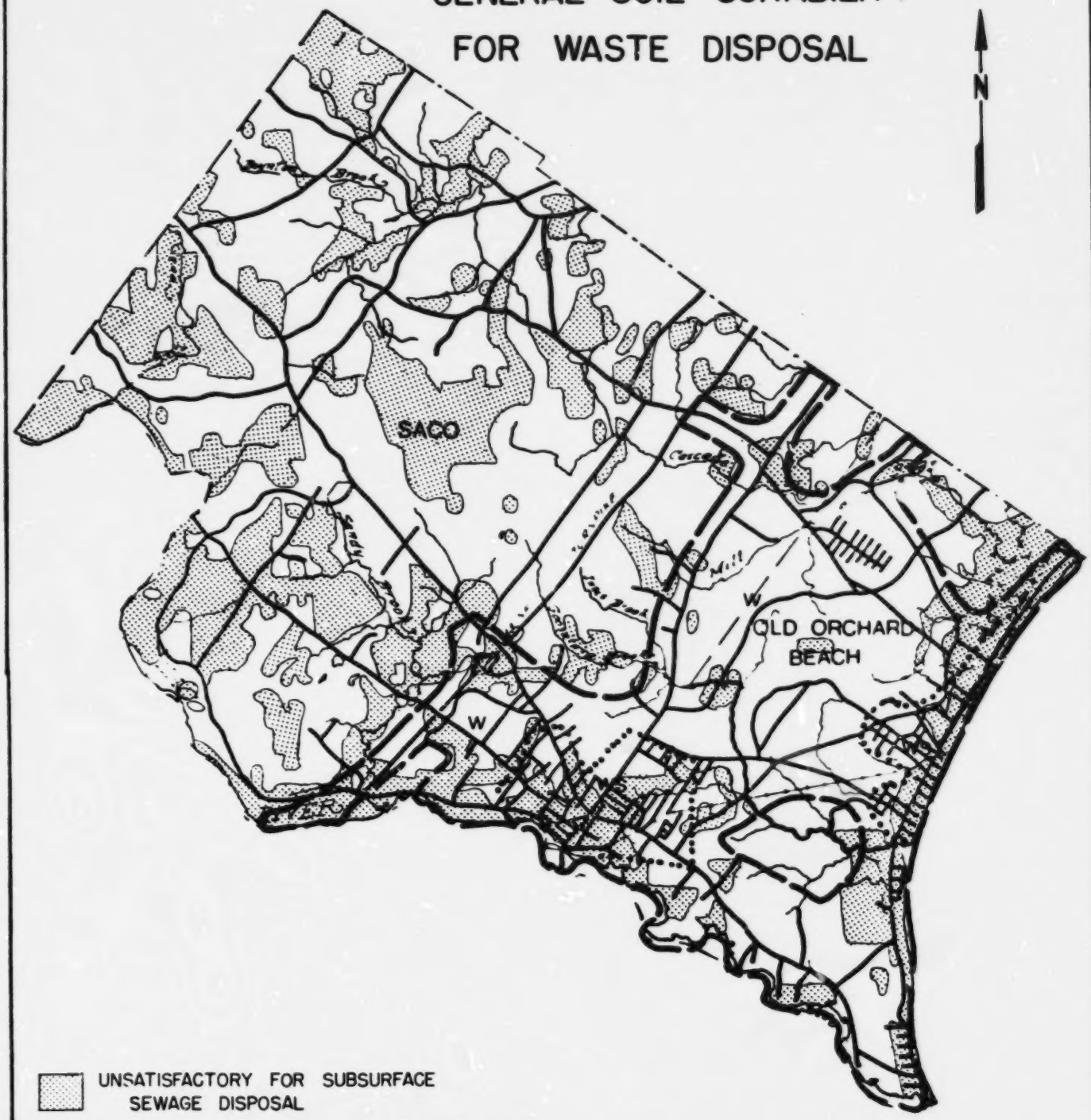
Because the Beach area is heavily developed, the principal determinent of future growth in Old Orchard Beach is the remaining vacant land. There is little industrial development anticipated; however, 3,900 new residents are anticipated over the next 25 years. The construction of the wastewater treatment and collection facility will tend to guide growth to sewered areas.

2. Alternatives and Recommendations

The Town should continue to implement the municipal wastewater facility plan. The Town's new secondary treatment facility is expected to significantly reduce the waste load on Goosefare Brook. Also recommended is reduction of infiltration in two areas of the Town--Walnut Avenue and the interceptor from the Ocean Park Road area. Infiltration in most

*● HIGH PRIORITY ◉ PRIORITY ⊕ LOW PRIORITY

GENERAL SOIL SUITABILITY FOR WASTE DISPOSAL



UNSATISFACTORY FOR SUBSURFACE SEWAGE DISPOSAL

POTENTIALLY SUITABLE FOR SUBSURFACE SEWAGE DISPOSAL

REPORTED DIRECT SEWAGE DISCHARGES

IDENTIFIED GROUNDWATER PROBLEM AREA

AREAS SERVED BY PUBLIC WATER (W)

AREAS SERVED BY PUBLIC SEWERS (S)

SCALE
0 6 12
THOUSAND FEET

FIGURE 7

of the other areas in the collection system is widespread and it has been shown, by the Town's consultant, to be more cost-effective to treat it rather than to rehabilitate the sewers. It is also planned to treat excess inflow from stormwater in the existing primary clarifier and chlorinate it before discharge to Goosefare Brook.

B. Management Considerations

1. Existing Conditions

The Town currently owns and operates the wastewater collection and treatment system in Old Orchard Beach.

2. Alternatives and Recommendations

The following management methods were considered and discussed in the management section of the 208 plan.

a. One single regional sewer district
b. County management of all facilities
c. Management by watershed
d. Management by sewer district for each population center
e. No change in the institutional arrangements

Although a single regional sewer district, county management, or other areawide/regional management agency would tend to reduce overall administrative costs and improve consistency in the provision of collection and treatment services, the establishment of such new agencies requires extensive, new legislative and institutional frameworks. Consequently implementation of a new authority may require a long period of time. Also, individual towns would have a reduced ability for self-determination regarding a town's desires for municipal services and population growth.

The analysis of these potential management agencies resulted in the conclusion that the existing cities, towns, and sewer districts have the authority to design, construct, and manage wastewater collection and treatment facilities. In addition, by minimizing institutional changes, the existing agencies and officials that have participated in the development of the Plan will likewise participate in the immediate implementation of the Plan. Therefore, existing management agencies should continue to design, construct, and manage wastewater collection and treatment systems.

C. Impact Assessment

The priority recommendation for the Old Orchard Beach wastewater collection and treatment system is the Grand Avenue extension. This sewer line extension has been assessed on the matrix on page 41. The construction of this sewer line will have a slight negative effect on Goosefare Brook water quality because of the additional waste collected, treated and discharged. Another negative impact of this extension will be the cost of the collector sewer.

The environmental benefit of this action will be improved groundwater quality because of the convection of users with septic systems in poor soils for

waste assimilation. In addition, an identified health hazard will be eliminated and recreational opportunities will be improved. This sewer line extension will also increase the potential for residential and commercial growth.

Sewage Disposal - Subsurface Systems

A. Technical Considerations

1. Existing and future conditions

The more rural inland areas of Old Orchard Beach are not served by sewage collection and treatment facilities. Development densities are generally low and no problems with malfunctioning subsurface sewage disposal systems have been indicated by town officials. However, there are several areas near the existing sewered area that are fairly well developed but not served by public sewerage. Although no subsurface disposal problems have been specifically identified, the potential for nuisance conditions of public health hazards may exist, especially as further development occurs in these areas.

2. Alternatives and Recommendations

Subsurface sewage disposal must remain as the major treatment and disposal method for domestic sewage wastes for rural or unsewered areas in the 208 region (cost of public sewers in these areas is prohibitive). Where problems have been defined, sewer service has been evaluated as an alternative to subsurface sewage disposal systems (see Sewage Disposal - Collection and Treatment Systems). Additionally, alternative toilet systems may be used to reduce the potential impact of sewage wastes on soils and groundwater.

In order to minimize future extensions of the wastewater collection system in the future, the Town should consider adopting Appendix 1 of the State Plumbing Code (which provides guidelines for minimum lot sizes where on-site systems are used--this is not a regulation) as part of the zoning ordinance.

B. Management Considerations

1. Existing Conditions

Each town presently regulates subsurface waste disposal in accordance with the State Plumbing Code. Each town has its own Local Plumbing Inspector (usually part-time) who is responsible for issuing permits and enforcing the Code. Soils analysis is done by State certified soil investigators. They submit soils reports to the Plumbing Inspector and the State Department of Human Services. Maintenance is the individual's responsibility; however, there is no legal requirement for maintenance or inspection of systems after installation.

Malfunctioning sewage disposal systems are declared by law to be a nuisance and must be abated upon order by the municipality.

2. Alternatives and Recommendations

The Maine State Plumbing Code is protective of the environment through proper design and installation of subsurface sewage disposal systems.

Alternatives considered to improve the effectiveness of the Code include improved State and local enforcement, mandatory maintenance and inspection, and regionalization of inspection and enforcement programs.

There should be stricter enforcement of the Plumbing Code. This can best be achieved by employment of a full-time, well qualified inspector hired to serve one or more towns. Maintenance should be required by the State and enforced through a local or regional inspection program. A funding program for rehabilitating systems should be investigated, utilizing EPA, Farmers Home Administration, Community Services Administration, and local banks as sources.

C. Impact Assessment

The major issue associated with this waste source is the increased local cost to implement an improved enforcement and inspection program related to the Plumbing Code. This moderate increase in cost will be balanced by improved reliability of subsurface sewage disposal resulting in improved water quality, health, and safety. A regional code enforcement program shared with Saco would cost an estimated $6,300 per year. This cost for maintenance and enforcement of the Plumbing Code could save potential investments in expensive sewage facilities by assuring the reliability and effectiveness of subsurface disposal.

A secondary impact of this action will affect the homeowners with malfunctioning septic systems. Mandatory rehabilitation is expected to cost the homeowner of a malfunctioning system from $20 for pumping to $2,000 for replacement.

Solid Waste Disposal

A. Technical Considerations

1. Existing and Future Conditions

The solid waste disposal area for Old Orchard Beach, located on the T for Turn Road, is about a mile and a half from the town center. It was opened in 1975 across the road from the previous disposal site for the town. The site is an abandoned sand pit. Operated as a sanitary landfill, there is sufficient volume for approximately 1 year of life based on a yearly generation of 10,000 tons. At present the site is operated as a dump with insufficient compaction and covering.

The site is surrounded by outwash derived soils, principally Windsors and Deerfields. These are well to poorly drained coarse sands, and are unsuitable for use with landfills without leachate management. Water is standing in various parts of the pit. Leachate is evident on the southwest side of the site as well as to the south and west of the abandoned disposal area. The abandoned area is being graded and covered with impervious soil. This should minimize the leachate problem from this area. Leachate is a problem at the existing site, and the extent of its migration is not known.

Old Orchard Beach is currently investigating an incineration-heat recovery system to solid waste in cooperation with Biddeford and Saco.

2. Alternatives and Recommendations

The following alternatives for solid waste disposal were reviewed for their applicability to Old Orchard Beach.

Source Separation and Recycling

Recovery of resources from waste has always played a role in solid waste management whether through scavenging or source separation. With today's increased cost of raw materials and environmental consciousness, recovery and recycling of wastes will increase. Resource recovery is being used to increase the life of landfill sites. Separation of wastes can either be practiced as a total system as in Nottingham, New Hampshire, or in association with more standard disposal systems. The municipal waste stream contains many materials which are readily recyclable and which may bring a profit as salvage value. The principal materials are paper, metal, glass, textiles, rubber, and plastic.

Sanitary Landfill

With greater emphasis being placed on the environmentally sound disposal of solid wastes, many new and varied systems of solid waste management are being practiced across the nation. Each of these systems eventually requires the disposal of a processed waste or waste residue (such as incinerator ash) which is generally accomplished by land disposal.

Sanitary landfill is the most acceptable form of land disposal. The American Society of Civil Engineers defines sanitary landfilling as:

> "A method of disposing of refuse on land without creating nuisances or hazards to public health or safety, by utilizing the principles of engineering to confine the refuse to the smallest practical area, to reduce it to the smallest practical volume, and to cover it with a layer of earth at the conclusion of each day's operation, or at such more frequent intervals as may be necessary."

A site is suitable for solid waste disposal as long as its use does not have an adverse impact on ground and surface waters nor detracts significantly from adjacent land use. The Rules and Regulations for Solid Waste Management promulgated by the DEP are based on this premise.

Baling and Shredding

Baling is the method of volume reduction which compresses refuse into high density bales which are then stacked in a landfill. A typical bale's dimension is 2½ x 2½ x 3½ feet. Available data indicate that densities within the bale may range from 1000-2000 pounds per cubic yard depending upon the nature of preprocessing and the type of baler. These densities are somewhat higher than the 1000-1200 pounds per cubic yard obtainable at a well run conventional landfill. The high densities of the bales tend to impede leachate flow. Sufficient leachate is generated, however, to require adequate safeguards to be taken at a baled landfill site. A disadvantage of balers is that once refuse

has been baled resource recovery is impractical. Balers are often used with transfer stations when transportation to a landfill is over a great distance or in conjunction with shredders to permit a higher density bale and to permit recovery following the shredding operation.

Another form of volume reduction is shredding. Shredders come in several forms, the most common being the hammermill. With the hammermill, rotating hammers pulverize the waste into a relatively homogenous material, with a maximum particle size generally less than three inches. As with a baler station, a shredding facility can be located in a built-up area and used in conjunction with a transfer station.

Shredding refuse increases landfill life and is generally readily accepted by the public. Problems with shredders include jamming of equipment, explosion of aerosol cans, and wear of the hammers. Shredder refuse is relatively innocuous. Properly landfilled and compacted, it does not attract vermin, support combustion, have an objectionable odor, or cause a litter problem, according to many reports. Often a shredded landfill is not required to provide daily or intermediate cover, although this generally depends on hydrogeologic as well as climatic considerations.

Incineration

The incineration of solid wastes for volume reduction has been practiced for many years. Until relatively recently, however, its use has been confined to metropolitan areas which generate sufficient volumes of solid waste to justify the high capital and operating costs associated with their use.

Within the past several years, however, modular incineration systems which operate on a controlled air principle have been developed. These incinerator units have capacities ranging up to 2 tons per hour and have been installed in systems with capacities up to 200 tons per day. Although costs are high, these systems should operate reliably over extended periods of time.

Incineration With Heat Recovery

The recovery of heat from solid waste incineration systems has long been practiced in Europe and other parts of the world. These systems, however, were generally limited to large municipal facilities in order to be economically feasible. The recent development of the modular controlled air incineration system has made it possible to recover heat with smaller systems. At least one small modular heat recovery system is now operating in New England with several others now in the planning stages. Heat recovery systems of this nature offer the most practical, reliable, and economical resource recovery alternative now available for areas with significant solid waste generation rates and a lack of suitable landfill sites. The sale of steam generated from the incineration of solid waste can dramatically reduce the unit cost of solid waste disposal. The success of an operation of this type, however, is completely dependent upon a constant supply of steam which can be sold.

A solid waste disposal sub-region is recommended for Biddeford, Saco, and Old Orchard Beach. The annual solid waste generation rate for

this subregion is estimated to be 46,000 tons per year. This figure includes residential, commercial and industrial solid wastes generated within the study area which are now being transported to the three municipal disposal areas. Specifically excluded from this figure are industrial wastes transported to other disposal facilities, municipal and industrial wastewater sludges, and solid wastes associated with major demolition projects and other short term, high volume incidents.

This study area is subject to large seasonal increases in population during the summer months. Associated with the increase in population is a concurrent increase in solid waste generation. Daily solid waste generation rates which reflect this increase in solid waste quality are shown in Table 1. The average values shown in the table reflect the solid waste generation rates during non-peak periods from mid-September through the first of June, 1976. The summer gereration data represents the average rates which occur during the tourist period in the months of July and August.

In Old Orchard Beach this increase is most dramatic with a four-fold increase from 15 tons per day to 60 tons per day. In Saco and Biddeford the increase is less dramatic: 25 percent and 20 percent, respectively.

In calculating these increases in solid waste generation rates during the summer, consideration has been given to the fact that residential and industrial solid waste generation rates do not show substantial seasonal fluctuations. Therefore, the increase in solid waste generation rates during the summer is attributed to the commerical segment.

For the purposes of this evaluation it has been assumed that the annual landfill volume requirements for the area are as follows: Biddeford - 30 acre - feet; Old Orchard Beach - 15 acre - feet; Saco - 24 acre - feet; Region - 69 acre - feet. The estimated disposal area requirements for a life of 15 years are: Biddeford - 23 acres; Old Orchard Beach - 11 acres; Saco - 18 acres; Region - 52 acres. Each of these areas must be increased as follows to provide the necessary buffer zones around the periphery of the disposal area: Biddeford - 50 acres; Old Orchard Beach - 25 acres; Saco - 35 acres; Region - 80 acres.

During the past several years numerous solid waste processing and disposal alternatives have been proposed and evaluated on a national basis by both government and private industry. However, at the present time there are relatively few proven solid waste processing/disposal alternatives available for areas the size of this study area within reasonable economic limits. The solid waste processing/disposal systems considered in this evaluation are those which have been demonstrated and proven to be reliable, effective and economic in processing solid wastes in the quantities generated within the study area. The estimated costs of each of these alternatives for the region is shown in Table 2. These systems include sanitary landfill, shredding or baling followed by landfill, incineration and incineration with heat recovery. These systems have been evaluated in the non-point section of the Plan. Although cost estimates indicate that a regional land fill is the most cost-effective method for solid waste disposal in Old Orchard Beach, potential landfill areas within the study area are rare and there has been strong public opposition to the development of new landfill areas. Therefore, an incineration system with provision for heat recovery appears to offer the most economical alternatives and political and social acceptability.

TABLE 5

SOLID WASTE INVENTORY - TONS

BIDDEFORD - SACO - OLD ORCHARD BEACH REGION

			Daily	
	Population	Annual	Avg[1]	Summer[2]
Old Orchard Beach	6,000	10,000	15	60
Saco	13,000	16,000	40	50
Biddeford	23,000	20,000	50	60

1) Daily average for year excluding summer months

2) Daily average during summer months

TABLE 6

ESTIMATED ANNUAL SOLID WASTE DISPOSAL COSTS

Municipality	Annual Generation	Individual			Regional			
		Sanitary Landfill	Baling Shredding	Incineration	Sanitary Landfill	Baling or Shredding	Incineration	Incineration with Heat Recovery
Biddeford	20,000	$110,000 $5.50/T	$200,000 $10/T	$300,000 $15/T	$90,000 $4.50/T	$140,000 $7/T	$260,000 $13/T	$120,000 $6/T
Old Orchard Beach	10,000	$ 85,000 $ 8.50/T	$120,000 $12/T	$170,000 $17/T	$45,000 $4.50/T	$70,000 $7/T	$130,000 $13/T	$ 60,000 $ 6/T
Saco	16,000	$100,000 $6.25/T	$160,000 $10/T	$256,000 $16/T	$72,000 $4.50/T	$112,000 $7/T	$208,000 $13/T	$ 96,000 $6/T

With each of these alternatives, both individual and regional voluntary resource recovery programs for selected materials (paper, ferrous metals, aluminum, glass) which have value and a ready market should be encouraged. Mandatory source separation for the purposes of recovery within this study area does not appear to be a viable alternative because of the large volumes of industrial wastes which must be handled and because of the large transient population during the summer months which could not be expected to participate in a voluntary source separation program.

There are a number of industries in the Biddeford - Saco area which are potential markets for steam, generated from the incineration of solid waste, among them Maremont and the Saco Tannery. Proposals have been received by the towns for incineration systems at each of these sites. Since the economic advantage of the systems depends on a maximum amount of energy being sold, an intensive solid waste inventory and survey of the energy needs of potential buyers should be made to obtain an accurate estimate of this disposal cost. Preliminary estimates indicate that incineration with heat recovery is the most viable disposal alternative available to the region other than landfill.

The existing site should be closed and covered with impervious cover material to minimize leachate problems.

B. Management Considerations

1. Existing Conditions

The municipality of Old Orchard Beach owns and operates a solid waste disposal site.

2. Alternatives and Recommendations

Old Orchard Beach has the option of continuing to own and operate a solid waste disposal facility or joining a regional waste disposal system. As indicated by the technical analysis, the cost estimates for waste disposal support the selection of the Biddeford - Saco - Old Orchard Beach disposal subregion. Funding for a feasibility study has been appropriated by the three municipalities through an interlocal agreement. A regional disposal district may be established by a special district or interlocal agreement.

C. Impact Assessment

In general, the alternative processing and disposal methods investigated in the plan primarily impact air and water quality. Sanitary landfills, regardless of the solid waste processing method selected, can impact water quality (groundwater and surface water) through generation of leachate. Incineration as a processing method reduces water quality impact while generating potential air quality impacts. Incineration with heat recovery has the same environmental impacts as standard incineration but reduces the economic impact (high cost of incineration) through revenues from sale of steam. Baling and shredding do not reduce water quality impact from leachate, but rather may provide economic benefit through increased landfill life. Source separation provides benefits through reduction of waste that must be disposed. These impacts are summarized in the Impact Assessment Matrix.

It must be noted that the feasibility study will provide the necessary data for a detailed impact assessment for the practicality of using a incineration heat recovery system for solid waste disposal in the sub-region. The major issue to be addressed will be the increase in air pollutants versus the generation of leachate in a sanitary landfill.

Runoff from Development

A. Technical Considerations

1. Existing and Future Considerations

Old Orchard Beach has sanitary sewers, combined sewers, and storm sewers. Combined sewers have at times overloaded the primary treatment plant and have caused bypassing of untreated flows to Goosefare Brook. The new secondary treatment plant will provide primary treatment and disinfection for untreated flows in excess of 3 MGD. The separate storm sewers discharge to the Atlantic Ocean via five outfalls and four small natural drainage courses.

Urban stormwater, as measured here, includes: the runoff which is intercepted by storm sewers, the runoff which contributes to inflow volumes in the combined sewers, and the runoff which flows overland following natural drainage patterns. The town has been subdivided into three areas for purposes of drainage area assignments--that which drains to Goosefare Brook, that which drains to Saco Bay, and that which drains to the Scarborough River. For each of these areas the "rational method" (see Point Source Control Plan) has been applied so as to calculate the volume of runoff from a typical storm event of the intensity and duration that occurs, on the average, once per week. The "urban" area very closely approximates the presently sewered areas of the town.

Stormwater Runoff per Weekly Storm Event

Urban Area	Drainage Acreage	Volume Per Storm	Receiving Waters Goosefare Brook
Goosefare Brook	470 acres	2.0 MG	Goosefare Brook
Scarborough River	175 acres	0.75 MG	Scarborough River
Saco Bay	400 acres	1.75 MG	Saco Bay

Assessment of Loadings

The concentration of pollutants which are presently being contributed to receiving waters--on a weekly basis--as a result of stormwater runoff are derived from the "generalized parameters" of stormwater discussed in the Point Source Control Plan.

Stormwater Loads per Weekly Storm Event

Receiving Waters	BOD_5 (lbs)	SS (lbs)	Total Nitrogen (lbs)	Total Phosphorous (lbs)	Fecal Coliform (MPN)
Goosefare Brook	500	10,500	50	17	3.03×10^{12}
Scarborough River	190	3,950	19	6	1.13×10^{12}
Saco Bay	440	9,200	44	14	2.65×10^{12}

By way of comparison, the effluent from the town's new secondary treatment facility will contain about 145 lbs/day of BOD_5 (1,015 lbs/week), 180 lbs/day of suspended solids (1,260 lbs/week), 150 lbs/day total nitrogen (1,050 lbs/week), 25 lbs/day total phosphorous (170 lbs/week) and 6.8×10^8 fecal coliforms/day (4.8×10^9/week).

2. Alternatives and Recommendations

There are two drainage areas of the town, Goosefare Brook and the marshland between East Grand Avenue and Ross Road that the town should minimize future direct discharges of stormwater. Where possible new development should utilize the natural percolation capability of the soil adjacent to homes to discharge water from roof drains, rather than direct discharge to streams or the street. The area near Portland Avenue and Ross Road mentioned previously, lies within the drainage area of the marsh west of Grant Avenue. Now would be the time to take measures to reduce the amount of surface water which could enter this and other marshes by direct piping. Surface water retention ponds and other alternatives to minimize the impact of stormwater could be developed during the review stage of subdivisions or prior to issuance of building permits.

Estimated flows and loads from the "Urban" area, approximates the present and potential future sewered areas.

Since very little development is projected in the areas which drain to Goosefare Brook and Saco Bay, the flows and loads will essentially be the same in the year 2000 as they are now. However high density development of the area north of Ross Road, with little control on surface water runoff, could increase the pollution load on the marsh west of Grand Avenue.

B. Management Considerations

1. Existing Conditions

The primary responsibility for controlling storm water runoff rest with the municipality.

2. Alternatives and Recommendations

Runoff from development can be limited by local codes and ordinances such as subdivision regulations and zoning ordinance performance standards. Additionally, the State Site Location Law requires erosion and sediment control plans for new development. The existing management agencies have adequate authority to control runoff. The Town has

the authority to regulate the use of land to limit runoff, and the local treatment authority has the power to control collected runoff. Therefore, no institutional changes are recommended. However, to improve controls to limit runoff municipalities are urged to review, modify and adopt the model subdivision regulations and zoning ordinance performance standards included in the Plan.

A technical review team should be funded through federal, state and local sources, to assist the municipality in establishing ordinances and in the review of proposed developments.

C. Impact Assessment

The technical recommendation is to utilize the natural percolation capability of soil adjacent to development. This may be achieved through the recommended ordinances, of which the essential purpose is to minimize the increase of runoff from developed lands, attempting to maintain to the extent possible the natural runoff conditions. This action will tend to eliminate storm related discharges to surface waters and reduce the potential for flooding. Controlling stormwater runoff at the source will decrease the demand for expensive collection and transport facilities.

A secondary impact of the implementation of the ordinances will be increased land development costs.

Salt Storage and Application

A. Technical Considerations

1. Existing and Future Conditions

Salt (sodium chloride) is used in Southern Maine to achieve bare pavement conditions during the winter months. Salt will continue to be used as long as the bare pavement policy is mandated and other highway de-icing chemicals are not used because of their prohibitive cost. Surface water quality problems have not been associated with highway de-icing salt uses. However, a small number of individual water supplies have been found to exceed chloride standards.

2. Alternatives and Recommendations

Since use of highway de-icing salt compounds will continue, general guidelines have been presented for the storage, handling and application of these compounds. These guidelines are sensitive to the conflicting policies of bare pavements in winter and clean water and attempt to strike a balance between the two.

B. Management Considerations

1. Existing Conditions

The State and municipalities have the authority and responsibility to maintain roads and highways in the region. The State has established guidelines and procedures for highway de-icing salt storage and application, and has developed educational and training programs for local operators.

2. Alternatives and Recommendations

Existing Maine laws should be investigated for enforcement powers related to regulate the use of highway de-icing compounds. In the absence of enforceable regulations and state level standards adequate to protection of the environment and compatible with policies related to winter driving conditions, MDEP, MDOT and the other agencies should collaborate on their development. This program development should include a series of checks and balances through required reporting, surveillance and/or sampling, and analysis.

C. Impact Assessment

Continued use of highway de-icing salt for road maintenance in the winter months will present a potential threat to surface and groundwater quality. Following recommended practices for storage and application of the salt will minimize the potential for water quality degradation while maintaining bare pavement policy. These practices may tend to increase the costs of providing facilities for salt storage; however, costs may be partially offset by the resulting conservation of salt.

Runoff from Construction Activities

A. Technical Considerations

1. Existing and Future Conditions

Because of the need to remove the cover vegetation and leave areas exposed during many construction projects, the potential for erosion and sedimentation is great. The soil loss can be extensive and can result in significant degradation of surface water through sedimentation and siltation. Since population projections indicate continued growth and development, construction activities will remain a potential source of water pollution.

2. Alternatives and Recommendations

Since erosion and sedimentation in the study area is principally site specific, each situation or occurrence must be considered in relationship to its own setting. The two major factors to be considered in erosion and sediment control are:

a. Reduction of the raindrop impact energy which reduces its dispersing and eroding power below the critical force and

b. Reduction of the velocity of the surface runoff which, in turn, lessens its abrading power and transporting capacity.

Probably the most effective method of reducing the impact energy of raindrops are those procedures which cover the soil; e.g., natural plant cover, mulching, temporary cover crops and paving or covering with non-erodable materials. If the precipitation falling on the site is not allowed to pick up velocity as it runs off then its erosive power is curtailed. Shortening the length of slope is one of the most effective methods of controlling runoff velocities. This shortening can be accomplished by various techniques such as structural measures, cropping or management patterns, or tillage practices.

It is recommended that the most cost-effective manner of instituting methods for controlling runoff from construction activities is through local land use regulatory controls.

B. Management Considerations

1. Existing Conditions

Construction controls are implemented at all levels. The Federal government imposes controls through the Federal Highway Administration, and the Corps' activities. The State imposes controls through the Site Location Law, the Great Ponds Law, the Wetlands Act, Stream Bulldozing, and Mandatory Shoreland Zoning. The Saco River Corridor Commission imposes controls on construction activities. Local controls are imposed through subdivision and zoning regulation.

2. Alternatives and Recommendations

Since the requisite legal authority to regulate construction activities exists, no institutional change is recommended. Municipalities should review, revise, and adopt appropriate versions of the Model Performance Standards for control of runoff and soil loss.

A technical review team should be funded by Federal, State, and local sources to assist the municipality in the establishment of ordinances and in the review of proposed developments.

C. Impact Assessment

The essential purpose of the recommended ordinances is to minimize the increase of runoff from agricultural lands, attempting to maintain to the extent possible the natural runoff conditions. This action will tend to eliminate storm related discharges to surface waters that may adversely affect water quality .

A secondary impact of the implementation of these ordinances could be increased costs for agricultural activities.

Petroleum Storage and Transfer

A. Technical Considerations

1. Existing and Future Conditions

From the evidence there is no question that petroleum products have the potential to contaminate water resources in the SMRPC 208 area. Furthermore, with the potential for more than 31 million gallons of #2 home heating fuel transferred in over 150,000 transactions and with over 16 million gallons of storage capacity within the 208 area, substantial opportunity for similar oil pollution will continue to exist for the foreseeable future. Assuming little change in present technological and other controls, spills and leaks will likely culminate in local long-term environmental degradation with little or no opportunity for corrective action.

ting activity (specifically exhaust emissions) may not cause major adverse effects on lakes; however, support facilities (e.g., marinas selling oil and fuel and doing repair work), accidents, and negligence in the handling of petroleum products may degrade water quality.

2. Alternatives and Recommendations

This planning effort did not address the large amount of technical control methods for the handling and distribution of petroleum products.

B. Management

1. Existing Conditions

Petroleum storage and transfer are currently managed by Federal, State and local governments. The Federal and State governments primarily regulate water transport, large on-land storage facilities, and discharge to groundwaters and surface waters. Local governments have the authority to control the siting of oil storage facilities adjacent to water bodies.

2. Alternatives and Recommendations

A State level program designed to identify the magnitude of petroleum related pollution should be developed. Applicable controls should be recommended and incorporated into legislative and regulatory programs. Local and regional input should be sought by the State in the design and implementation of the program.

C. Impact Assessment

As long as substantial volumes of petroleum products are handled, stored, transferred and consumed in the SMRPC 208 area, contamination of water resources is likely to continue. Assuming little change in present technological and management controls, spills and leaks will likely culminate in local long-term environmental degradation with little or no opportunity for corrective action. However, a State level program designed to improve the handling of petroleum products will minimize the potential of petroleum related pollution in Maine.

SOUTHERN MAINE REGIONAL PLANNING COMMISSION
AREAWIDE WASTE TREATMENT MANAGEMENT PLAN

IMPACT ASSESSMENT MATRIX

OLD ORCHARD BEACH

LEGEND

- ■ VERY NEGATIVE
- □ NEGATIVE
- □ NO IMPACT
- ■ POSITIVE
- ■ VERY POSITIVE

FACTORS IMPACTED

			NATURAL FACTORS																						CULTURAL FACTORS														COST COMPARISON	
			LAND		SURFACE WATERS									GROUNDWATER						AIR				FLORA			FAUNA				LAND USE						Recreation		SOCIAL							ECONOMIC					
	TECHNICAL & MANAGEMENT ALTERNATIVES		SOIL	UNIQUE PHYSICAL FEATURES	DISSOLVED OXYGEN	BIOLOGICAL OXYGEN DEMAND	SUSPENDED SOLIDS	NUTRIENTS	DRINKING WATER SUPPLY	TEMPERATURE	TURBIDITY	BACTERIA & VIRUSES	Toxic Substances & Heavy Metals	CHLORIDES	NITRATES	PHOSPHATES	HEAVY METALS	BATERIA & VIRUSES	DRINKING WATER SUPPLY	PARTICULATES	NITROGEN OXIDES	SULFUR OXIDES	TOXIC SUBSTANCES	NATURAL VEGETATION	MANAGED VEGETATION	AQUATIC VEGETATION	BIRDS	LAND ANIMALS	FISH & SHELLFISH	FOOD CHAINS	Open Space, Wetlands, Forest	AGRICULTURAL	RESIDENTIAL	COMMERCIAL	INDUSTRIAL	FISHING	WATER RECREATION	POPULATION GROWTH	DEVELOPMENT PATTERN	EMPLOYMENT	HEALTH & SAFETY	INSTITUTIONS	WATER SUPPLY	RECREATION	FISHING	MANUFACTURING	CAPITAL COST	Operation/Maintenance Cost
WASTE SOURCES	SEWAGE DISPOSAL COLLECTION & TREATMENT SYSTEMS — Treatment Alternatives	NO ACTION																																																
	SEWAGE DISPOSAL COLLECTION & TREATMENT SYSTEMS — Regional Alternatives																																																	
	SEWAGE DISPOSAL COLLECTION & TREATMENT SYSTEMS — Sewer Extensions	GRAND AVENUE EXTENSION		■										■	■	■		■															■	■			■	■		■				■					
		NO GRAND AVENUE EXTENSION																																																
	SEWAGE DISPOSAL COLLECTION & TREATMENT SYSTEMS — Management Alternatives	USE EXISTING AUTHORITY																																																
		DEVELOP NEW AUTHORITY																																																
	SEWAGE DISPOSAL SUBSURFACE SYSTEMS — Treatment Disposal Systems	SUBSURFACE WASTE DISPOSAL																															■				■			■									
		ALTERNATIVE TOILETS													■		■							■																										
		SEWER EXTENSIONS													■		■																■	■			■	■		■					■		■	■	■
	SEWAGE DISPOSAL SUBSURFACE SYSTEMS — Management Alternatives	USE EXISTING AUTHORITY																																																
		STRICT CODE ENFORCEMENT													■		■														■					■	■			■										
		MAINTENANCE PROGRAM													■		■																																		
		REGIONAL CODE MANAGEMENT																																																■
	SEPTAGE DISPOSAL — Disposal Methods	NO ACTION																																																
		TREATMENT PLANT																																																
		LAND APPLICATION																																																
		INCINERATION																																																
	SEPTAGE DISPOSAL — Management Activities	USE EXISTING AUTHORITY																																																
		REGIONALIZATION																																																
	SLUDGE DISPOSAL — Disposal Methods	NO ACTION	■												■		■																										■							
		LAND APPLICATION	■																																															
		INCINERATION	■												■		■																																	■
		COMPOSTING																						■																										
	SLUDGE DISPOSAL — Management Alternatives	USE EXISTING AUTHORITY																																																
		REGIONALIZATION																																																■
	SOLID WASTE DISPOSAL — Disposal Methods	NO ACTION	■		■	■	■				■	■		■	■	■	■	■														■																	
		SOURCE SEPARATION	■		■	■	■				■	■		■	■	■	■	■														■									■									
		BAILING OR SHREDDING																																																■
		INCINERATION	■		■	■	■				■	■		■	■	■	■	■														■																	■
		INCINERATION WITH HEAT RECOVERY	■		■	■	■				■	■		■	■	■	■	■														■																	■
		SANITARY LANDFILL																																																
	SOLID WASTE DISPOSAL — Management Alternatives	USE EXISTING AUTHORITY																																																
		REGIONALIZATION																																																■

SACO

WASTE SOURCES ADDRESSED	PRIORITY*
SEWAGE DISPOSAL - COLLECTION AND TREATMENT SYSTEMS	●
SEWAGE DISPOSAL - SUBSURFACE SYSTEMS	●
SEPTAGE DISPOSAL	⊕
SLUDGE DISPOSAL	●
SOLID WASTE DISPOSAL	●
INDUSTRIAL WASTE DISPOSAL	●
RUNOFF FROM DEVELOPMENT	◉
RUNOFF FROM AGRICULTURE	⊕
SALT STORAGE AND APPLICATION	⊕
RUNOFF FROM CONSTRUCTION ACTIVITIES	⊕
PETROLEUM STORAGE AND TRANSFER	⊕

Sewage Disposal - Collection and Treatment Systems

A. Technical Considerations

1. Existing and Future Conditions

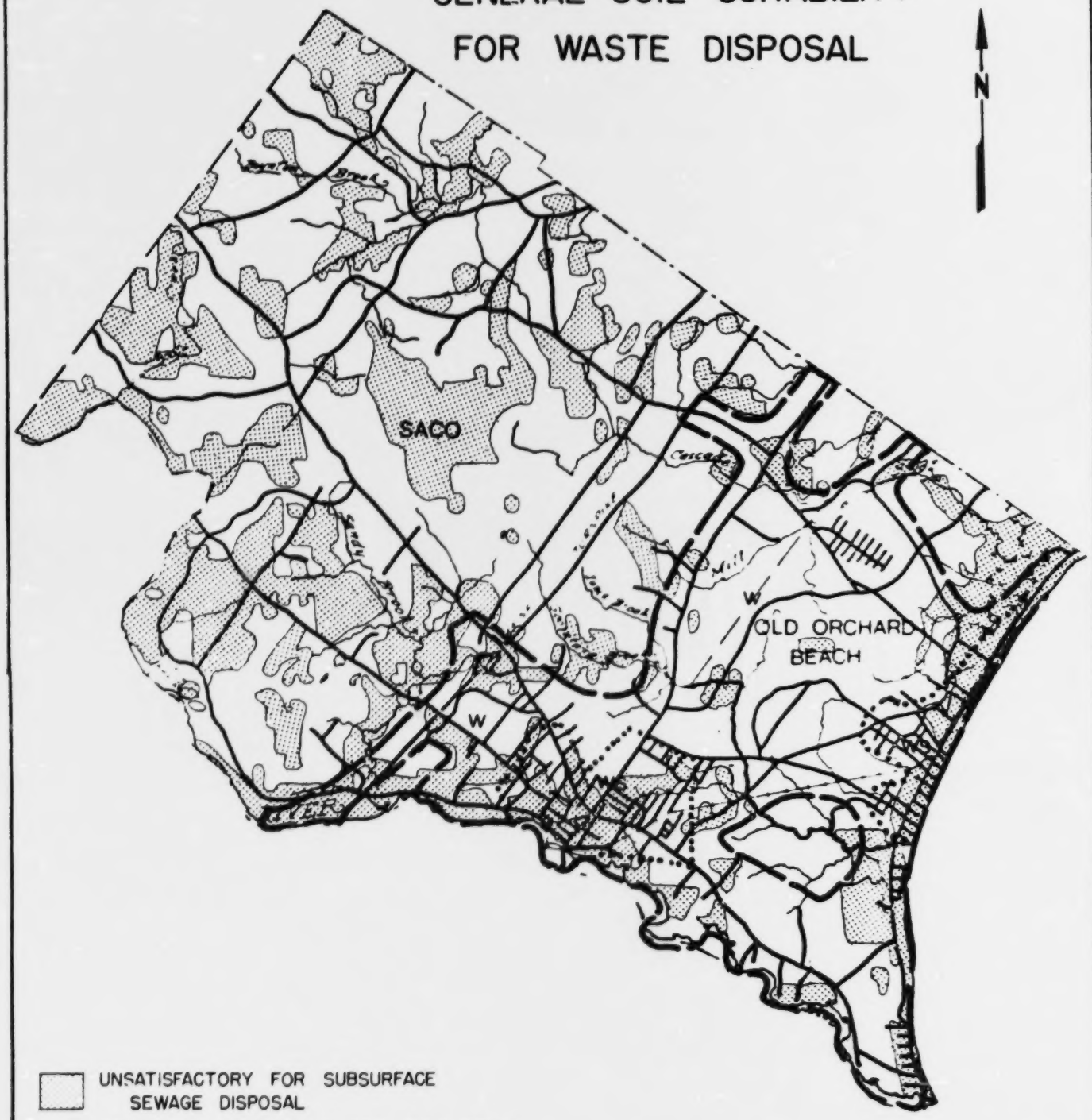
The City of Saco has three distinct wastewater collection systems. The largest serves residences, industries, and commercial establishments over about 1,100 acres in urbanized portions of the City. A small collection and treatment system on Factory Island handles primarily industrial flows along with a minor amount (less than 10% of the average daily flow) of domestic sewage. The third system serves the industrial park north of the urbanized area. See the Plan, Chapter II, Saco for a map of the collection system.

Approximately 7,500 of the City's 12,500 residents are served by the main sewerage system, which consists of 6.3 miles of separate sanitary sewers and 14.7 miles of combined sewers. Asbestos cement, vitrified clay, brick, granite, and even timber have been used for sewer construction in Saco over the last 115 years; some of the older pipes are therefore in need of replacement.

The coastline of Saco as well as the lower Saco River estuary including the Kinney Shores, Bay View, Ferry Beach, and Camp Ellis areas are quite densely developed and not presently served by the municipal sewerage system. Although many of the homes are seasonal (the beach population triples in the summer), conversion to year-round dwellings

● HIGH PRIORITY ◉ PRIORITY ⊕ LOW PRIORITY

GENERAL SOIL SUITABILITY FOR WASTE DISPOSAL



UNSATISFACTORY FOR SUBSURFACE SEWAGE DISPOSAL

POTENTIALLY SUITABLE FOR SUBSURFACE SEWAGE DISPOSAL

REPORTED DIRECT SEWAGE DISCHARGES

IDENTIFIED GROUNDWATER PROBLEM AREA

W AREAS SERVED BY PUBLIC WATER

S AREAS SERVED BY PUBLIC SEWERS

SCALE

0 6 12

THOUSAND FEET

FIGURE 8

is occurring in the area. Saco's consultant, in the January 1976 wastewater facilities planning report, recommended that a high priority be placed on sewering these coastal developments to reduce the potential for pollution and aesthetic degradation of the beach areas. Many of the on-site systems in this area are reported to be failing and causing wastewater to pond on the surface.

In 1977 the City plans to conduct a subsurface wastewater survey along Ferry Road between the urban area and the coastal region to determine the need for sewering an additional 150 homes in this area. This is a potential growth area in the city and public sewers may be needed if high density housing is desired.

Another potential growth area in the city is east of the Maine Turnpike between Routes 5 and 12. At the present time there are about 90 to 100 homes in this area. Soil is generally marginal or poor for on-site sewage disposal.

The City of Saco is serviced by three wastewater treatment plants: the Industrial Park secondary treatment plant, the City proper secondary treatment plant, and the Factory Island primary treatment plant. Each is described separately below.

Industrial Park Treatment Plant

The Industrial Park treatment facility, licensed by NPDES permit No. ME0101125 and Maine waste discharge license No. 568, is an extended aeration package treatment plant. The facility has been operational since 1962. Unit operations and processes include: aeration, sedimentation, sand filtration, and chlorination. Sludge is trucked to the City Proper facility for dewatering and disposal. The effluent is discharged to Goosefare Brook, a class C waterway. The facility services a separate collection system; there are no major industrial users.

The plant is designed to treat an average daily flow of 0.25 mgd; actual flow rates have averaged 0.015 mgd. Extensive influent and effluent analyses are not available but the BOD and total suspended solids content of a 24-hour composite sample taken in May of 1976 was 60 mg/l and 34 mg/l respectively.

The plant is ineffective as a treatment facility; extensive renovations are required. Seasonally, the discharge from the plant constitutes a major portion of the flow in Goosefare Brook. For these reasons, the City proposes converting the facility to a pump station, and discharge via force main to the existing sewer on North Street. Treatment would be at the Proper plant.

City Proper Treatment Plant

The City Proper secondary wastewater treatment plant, licensed by NPDES permit No. 0101117 and Maine waste discharge license No. 472, treats most of the wastewater from the city's residential and commercial areas. The plant has been operational since 1974; unit processes and operations include: grit removal, primary clarification, mechanical aeration, secondary clarification and chlorination. The effluent is discharged to the Saco River, a class SC waterway. Sludge, after processing in a flotation thickener, is dewatered on a vacuum filter and then trucked to

the City's sanitary landfill.

The plant is designed to treat an average flow of 1.4 mgd; actual flows have averaged 1.5 mgd, a violation of the facility's NPDES permit. As a result, a moratorium on new house connections has been established.

The facility services a combined sewer system, flows greater than 3.5 mgd are bypassed to the Saco River after chlorination. Approximately 256,000 gallons per day of infiltration and 102,900 gallons per day of inflow could be economically removed from the City's sewerage system, according to the City's "201" consultant.

Extensive influent and effluent analyses are not available; however, the BOD and total suspended solids content of two effluent 24-hour composite samples taken in the spring and summer of 1976 averaged 57 mg/l and 59 mg/l, respectively. The fecal coliform counts were less than 10 colonies per 100 ml for both samples. The plant does not always meet its NPDES permit discharge limitations of 30 mg/l of BOD and 30 mg/l of total suspended solids. It does appear to comply with the required fecal coliform value of 15 colonies per 100 ml.

Factory Island Treatment Plant

The Factory Island treatment plant, licensed by NPDES permit No. ME0101133 and Maine waste discharge license No. 817, has been operational since 1972. The facility principally treats wastes from the Saco tannery, which contributes approximately 90% of the flow. Domestic wastes from Saco comprise the remaining 10%. Unit operations include equalization and sedimentation. The effluent is not disinfected prior to discharge to the Saco River, a class SC waterway. Sludge is presently dewatered by a centrifuge and belt press.

Flows average about 1.3 mgd and are high in chromium, BOD, total suspended solids, and oil and grease. The effluent averages 800 mg/l (8,675 lbs. per day) of BOD, 700 mg/l (7,510 lbs. per day) of suspended solids, 60 mg/l (650 lbs. per day) of chromium, and 225 mg/l (2,440 lbs. per day) of oil and grease. Prior to improvements in plant operating efficiencies, the effluent contained, according to sampling performed by the Maine Department of Environmental Protection on January 14 and 15, 1976, the following: BOD--12,640 lbs. per day, total suspended solids--100,541 lbs. per day, oil and grease--180 milligrams per liter, total chromium--1,148 lbs. per day. The plant's Maine waste discharge license was recently revised to reflect more closely the plant's actual operating performance. These discharge limitations include: BOD--800 milligrams per liter (8,673 lbs. per day), total suspended solids--(7,509 lbs. per day), total chromium--50 mg/l, (550 lbs. per day), oil and grease--225 mg/l (3,250 lbs. per day, maximum).

The Maine DEP conducted a sampling program of the Saco River during the period from June to October, 1975. Samples were taken from at least six stations from the mouth of the river to near its point of entry into the 208 Area (at the Rte. 5 bridge near the Dayton-Biddeford boundary). In the tidal and urban stretch of the river, where are located the outfalls of three treatment plants, as well as most of the

diversion structure discharge points, both the fecal and total coliform counts exceeded statutory limits (300 for fecal and 1500 for total coliform for Class SC waters) in all 1975 samples. Upstream from the treatment plants the Class C and B-2 freshwater standards for coliform, however, were met by the 1975 samples.

A recent study of non-point sources affecting water quality in the 208 Area concluded that excessive coliform sample-counts in the SC portion of the river could be attributed, in the main, to treatment plant discharges and overflows/bypasses of the urban sewer collection system of the two cities. As for the treatment plants--recent fecal coliform counts/100 ml of their effluents averaged:

Biddeford STP:	153
Factory Island (Saco) STP:	120
City Proper (Saco) STP:	10

However, total and fecal coliform counts above the Biddeford and Saco City Proper plants have been extremely high. For example, on June 4, 1975, total coliforms, as reported in the Maine DEP's "Water Quality of the Mousam, Ossippee, Saco and York Rivers", were 86,000/100 ml and fecal coliforms 14,400/100 ml. This sampling point was below the Factory Island Treatment facility. Downstream at Chase's Point on that same day total and fecal coliforms were 9,800 and 930/100 ml respectively; and 5000 and 350/100 ml at Camp Ellis. Above the Factory Island plant, about 2½ miles upstream, total and fecal coliforms are within B standards of classification. This water sampling data indicates that the Factory Island treatment facility is a major contributor of total and fecal coliform bacteria to the Saco River. (No other point source discharges are known in that area that could result in such a high level of coliform bacteria.)

Shellfish areas in Biddeford's tidewaters (along the Saco estuary and in the Biddeford Pool area) have been closed to diggers because of high coliform counts. Contributions of bacteria from upstream point sources cannot, at this time, be differentiated from non-point sources closer to the estuarine shellfish beds, so that it is impossible to assign a degree of responsibility for pollution of these beds to any of the several upstream point and non-point sources.

Dissolved oxygen levels and BOD loadings in the Class SC portion of the river, as measured by the DEP in 1975, appear to be well within acceptable limits. This is also true for the Class C and B-2 sections.

Metal concentrations in some sampled instances, however, may indicate a degree of hazard to some of the more sensitive marine organisms. Though the State of Maine does not have routinely applied standards for metals in marine ecosystems the National Academy of Sciences (NAS) has suggested limits of "minimal risks" for a number of metals. The following tables compares Saco River metal content in samples with those minimal risk concentrations suggested by the NAS.

	Saco River Tidal Samples: Maximum: June-Oct. 1975	NAS: Minimal Risk
Lead (mg/l)	.2	.01
Chromium mg/l	1.9	.05
Copper (mg/l)	.02	.01
Zinc (mg/l)	.03	.02
Nickel (mg/l)	.13	.002

Chromium levels, especially those identified as emanating from the Factory Island treatment plant, have been a recent cause for concern. Concern has been not only with concentration in the seawater but also the accumulation in sediments downstream -- especially where shellfish and other deposit-feeding organisms (e.g. lobsters) exist. Metals, in general, vary in their toxicity with the influence of synergistic effects from other constituents in the marine environment. And toxicity varies with the stage of development of an organism as well as with the organism's position in the ecosystem's food chain. Considerable magnification of metals occur from a lower trophic level to a higher level, with the result that toxicity is dependent upon the organism specified.

2. Alternatives and Recommendations

After the city expands its treatment facilities and reduces infiltration/inflow to a cost-effective level, expansion of the collection system can be considered. One of the first areas where extensions should take place is along Rte. 112 (Buxton Road) to the Middle School. It is proposed to convert the Industrial Park treatment facility to a pump station and discharge, via force main to the sewer extension on Buxton Road. The "201" Facilities Plan indicates the sewers on Buxton Road, North Street (8-inch) and cross country to the (8-inch) sewer on Spring Street may have to be "resized" at the time of construction of this phase. The need for parallel sewers depends on how much area the city decides to sewer in the vicinity of the Turnpike and the ability or need for industrial users to provide flow equalization.

In addition to the industrial park and the Middle School (at the end of this potential extension) consideration should be given to accepting pretreated waste from the Maremont Corporation. The only way to achieve a "B" status of Goosefare Brook is to eliminate Maremont's discharge. However, this could increase the heavy metals load on the Saco River. The University of Maine proposal to study the effects of chromium on the Saco River, if funded, would contribute to the decision making process as to whether Maremont's effluent should remain in Goosefare Brook or be transferred to the Saco River.

Estimated cost of the pump station and force main to serve Middle School, the pump station and force main from the Industrial Park and the gravity sewer along Buxton Road is $467,700.

Wastewater treatment needs in Saco are:

(a) upgrading operations at the existing treatment facilities
(b) providing secondary treatment for all domestic and industrial sewage generated in the city.

The city's first priority should be to upgrade the operation of the existing City Proper secondary treatment facility and to "expand" the facility by removing excessive infiltration and inflow. The removal of the 360,000 gallons of excessive infiltration and inflow identified in the city's "201" report may provide the treatment capacity needed to lift the current moratorium on housing construction in the city without waiting for the proposed secondary facility to be built.

The City's Facility Plan recommends construction of a 3.5 mgd extended aeration facility adjacent to the existing City Proper plant.

Proposed Secondary Facility: Unit processes and operations would include: earthen aeration tanks (extended aeration process), covered reactor clarifiers, and possible sand filters. The plant would treat only separated domestic and industrial flows and would be designed for an average daily flow of 3.5 mgd and a peak daily flow of 8 mgd. The gravity sand filters would not "polish" the effluent but would act as a backup to the reactor clarifiers if the effluent BOD and suspended solids levels were to increase beyond permit limitations.

The next priority for the city to consider is providing secondary treatment for the primary effluent from the Factory Island plant, for the wastewater now influent to the ineffective Industrial Park package secondary plant and for sewage from areas not now serviced but which may be serviced by the year 2000. Design began in early May, 1977, on modifications to the Factory Island primary treatment facility.

According to the City's "201" plan, the Factory Island plant can be upgraded to provide between 45 to 50% BOD removal and 70 to 85% total suspended solids removal by:

(a) modifying the wastewater flow distribution to the two existing equalization tanks, thereby equalizing the flow of chromium to the treatment facility.

(b) increasing the efficiency of the sedimentation process by adding a ployelectrolyte to the influent after equalization and modifying the existing clarifier to a reactor type clarifier with upflow design and a flocculation compartment.

Pilot plant work being performed as part of the design process may suggest alternative modification schemes.

The Saco Tanning Corporation is currently considering in-plant modifications that may reduce the BOD content of wastewaters influent to the Factory Island facility by 50%. With pretreatment at Factory Island (improved primary treatment) and discharge of the effluent to the expanded City Proper facility, the effluent load (BOD and SS) to the Saco River will be significantly lower than present loads.

The quantity of sewage in the City of Biddeford may, by 1995, exceed the capacity of their sewage treatment facility. Because of space limitations, expansion may be very expensive. The Saco Coastal area, now serviced by septic tanks, will likely receive sewage services within the planning period. The "201" plan recommended constructing

enough capacity in the proposed secondary facility to service both Biddeford and the Saco Coastal area. However, as discussed in the Biddeford section of this report and as will be discussed further in this section, the need for providing this extra capacity for Biddeford is not certain. The city may wish to consider, if cost-effective, designing the plant so that it can be easily expanded in the event that additional capacity is required to treat flows from Biddeford rather than actually constructing that capacity at this time.

Once the secondary plant is constructed, the city could proceed with conversion of the Industrial Park treatment facility to a pump station and the sewering of the Maremont Corporation.

The "201" plan recommends the sewering of the Saco Coastal area, and pumping the sewage to the proposed secondary facility. Because of the density of housing in this area, this recommendation is advisable. In addition, the city may wish to consider on-site treatment facilities.

Only within the last year or two has the U.S. Environmental Protection Agency encouraged the consideration of smaller, decentralized sewage treatment systems. One alternative that may be suitable for the Saco Coastal area is the septic tank-sand filter-chlorination system. Effluent from a septic tank is conveyed to a sand filter for additional BOD and suspended solids removal and is then disinfected, usually by dry chlorine compounds, before discharge to a watercourse. With proper operation and maintenance, the system can consistently produce an effluent meeting Federal discharge limitations. In order for the systems to be eligible for state and federal aid, it must:

(a) be owned, operated, monitored, and maintained by the city.
(b) be located on public property or on land where easements provide the municipality the right to construct, operate, monitor, and maintain the facility.
(c) serve a group of users (systems serving only an individual home are <u>not</u> eligible).

While the treatment system itself is not complicated, the management of many such systems is complex. The city may wish to consider installing several systems, evaluating their performance, then comparing both the performance and cost of the on-site systems with a centralized sewage collection and pumping system. This system may require limited interceptor sewer construction to minimize the number of outfalls extending out into the beach area.

Summary of Recommendations

Upgrading operations at the existing City Proper and Factory Island treatment facilities and expansion of the City Proper facility to accommodate pretreated flows from Saco Tanning Corporation (Factory Island plant) are seen as the high priority treatment needs of the City. When expansion of the City Proper plant is completed, the Industrial Park treatment facility should be converted to a pump station and discharge to the City Proper system. The decision to sewer Maremont to City Proper is a complex one and should be based in part on additional information on the effects of heavy metals on the Saco River ecosystem.

Infiltration/inflow studies have been conducted by the City's consultant. A program to eliminate inflow in a number of areas in the City is already underway. It is estimated that infiltration/inflow can be reduced by about 360,000 gpd.

A detailed sewer system evaluation survey, including televising of lines, should be accomplished to pinpoint sources of infiltration and to develop a cost-effective program for reduction of infiltration.

B. Management Considerations

1. Existing Conditions

The City of Saco owns and operates the wastewater collection and treatment system in Saco.

2. Alternatives and Recommendations

The following management methods were considered and discussed in the management section of the 208 plan.

a. One single regional sewer district
b. County management of all facilities
c. Management by watershed
d. Management by sewer district for each population center
e. No change in the institutional arrangements

Although a single regional sewer district, county management, or other areawide/regional management agency would tend to reduce overall administrative costs and improve consistency in the provision of collection and treatment services, the establishment of such new agencies requires extensive, new legislative and institutional frameworks. Consequently implementation of a new authority may require a long period of time. Also, individual towns would have a reduced ability for self-determination regarding a town's desires for municipal services and population growth.

The analysis of these potential management agencies resulted in the conclusion that the existing cities, towns, and sewer districts have the authority to design, construct, and manage wastewater collection and treatment facilities. In addition, by minimizing institutional changes, the existing agencies and officials that have participated in the development of the Plan will likewise participate in the immediate implementation of the Plan. Therefore, existing management agencies should continue to design, construct, and manage wastewater collection and treatment systems.

C. Impact Assessment

As a high priority, modifications to Saco's wastewater collection and treatment facilities have been assessed for their impact in a qualitative manner utilizing a summary matrix. This matrix presents the major proposals for Saco's system and relates these to the natural and cultural factors that may be impacted through primary or secondary effects of the proposed facilities.

As indicated by the water quality evaluation in the point source plan, no action to improve wastewater treatment in Saco would have a significant adverse impact on water quality of the Saco River estuary and Goosefare Brook. The existing poor water quality will have secondary cultural impacts such as decreased recreational and fishing opportunities and a negative effect on residential, commercial and industrial growth. Additionally the toxic pollutant discharges pose a threat to aquatic life and fish/shellfish food chains in the Saco and Goosefare estuarine ecosystems.

The upgrading of the Factory Island treatment plant will eliminate a portion of the existing pollution problems; however it will not provide adequate treatment to be considered a positive impact on water quality. The construction of the new secondary treatment facility and the improvements to the City Proper treatment plant will provide, as indicated in the Point Source Chapter of the Plan, sufficient treatment to positively impact the water quality of the Saco River and Goosefare Brook. Improved water quality will have a beneficial affect on the fishing and recreational opportunities. Additionally, the added capacity of the new facility will provide a stimulus for municipal growth.

Although the recommended wastewater treatment improvements will facilitate the river's return to fishable - swimmable quality according to standard parameters (e.g., BOD, DO, bacteria), heavy metals discharges continue to pose a threat to aquatic life and food chains that may affect humans.

Sewage Disposal - Subsurface Systems

A. Technical Considerations

1. Existing and Future Conditions

A majority of the land area in Saco is not served by the public sewerage system. Outlying areas are therefore dependent on on-lot subsurface sewage disposal systems and, in many cases, wells for water supply also. Kinney Shores and North Saco are the two areas of the city where unsewered development is most heavily concentrated. Concern has been raised in North Saco over the adequacy of existing lot-size requirements with regard to successful operation of septic tank systems. Review of the soil suitability map for subsurface sewage disposal prepared by the Southern Maine Regional Planning Commission indicates soils in a large portion of the unsewered areas in the Town are not well suited for on-site sewage disposal.

2. Alternatives and Recommendations

Subsurface sewage disposal must remain as the major treatment and disposal method for domestic sewage wastes for rural or unsewered areas in the 208 region (cost of public sewers in these areas is prohibitive). Where problems have been defined, sewer service has been evaluated as an alternative to subsurface sewage disposal systems (see Sewage Disposal - Collection and Treatment Systems). Additionally, alternative toilet systems may be used to reduce the potential impact of sewage wastes on soils and groundwater.

In order to minimize future extensions of the wastewater collection system in the future, the Town should consider adopting Appendix 1 of the State Plumbing Code (which provides guidelines for minimum lot

sizes where on-site systems are used--this is not a regulation) as part of the zoning ordinance.

B. Management Considerations

1. Existing Conditions

Each town presently regulates subsurface waste disposal in accordance with the State Plumbing Code. Each town has its own Local Plumbing Inspector (usually part-time) who is responsible for issuing permits and enforcing the Code. Soils analysis is done by State certified soil investigators. They submit soils reports to the Plumbing Inspector and the State Department of Human Services. Maintenance is the individual's responsibility; however, there is no legal requirement for maintenance or inspection of systems after installation.

Malfunctioning sewage disposal systems are declared by law to be a nuisance and must be abated upon order by the municipality.

2. Alternatives and Recommendations

The Maine State Plumbing Code is protective of the environment through proper design and installation of subsurface sewage disposal systems. Alternatives considered to improve the effectiveness of the Code include improved State and local enforcement, mandatory maintenance and inspection, and regionalization of inspection and enforcement programs.

There should be stricter enforcement of the Plumbing Code. This can best be achieved by employment of a full-time, well qualified inspector hired to serve one or more towns. Maintenance should be required by the State and enforced through a local or regional inspection program. A funding program for rehabilitating systems should be investigated, utilizing EPA, Farmers Home Administration, Community Services Administration, and local banks as sources.

C. Impact Assessment

The major issue associated with this waste source is the increased local cost to implement an improved enforcement and inspection program related to the Plumbing Code. This moderate increase in cost will be balanced by improved reliability of subsurface sewage disposal resulting in improved water quality, health, and safety. A regional code enforcement program shared with Old Orchard Beach would cost an estimated $5,645 per year. This cost for maintenance and enforcement of the Plumbing Code could save potential investments in expensive sewage facilities by assuring the reliability and effectiveness of subsurface disposal.

A secondary impact of this action will affect the homeowners with malfunctioning septic systems. Mandatory rehabilitation is expected to cost the homeowner of a malfunctioning system from $20 for pumping to $2,000 for replacement.

Septage Disposal

A. Technical Considerations

1. Existing and Future Conditions

It is estimated that Saco's present septage generation amounts to 349,000 gallons annually and will reach 564,000 gallons by the year 2000. The present disposal practice involves the release of septage from the tank trucks to a manhole near the Bear Brook pump station after 50 pounds of lime have been added to provide some odor control.

The mixture of septage and waste water is then pumped 1.2 miles to the waste water treatment plant--a conventional activated sludge plant. This procedure is not acceptable to the Maine Department of Environmental Protection and is considered to be a temporary procedure until other facilities have been developed.

2. Alternatives and Recommendations

As an alternative to the present unacceptable procedure for handling septage, plans have been developed to use part of an old Imhoff plant at the Bear Brook pump station that is now being operated as a storm water overflow-equalization tank. The plan proposes that the septage be discharged to one of the three sludge digestion chambers and aerated. Supernatant from this tank would be drawn off and pumped to the Saco treatment plant. The old sludge drying beds would be used for dewatering the septage. With a volume of 20,000 gallons the unit would provide one to two weeks retention of septage. This should be adequate capacity to handle the estimated septage load through the year 2000.

B. Management Considerations

1. Existing Conditions

The municipality is responsible for providing an approved septage disposal site and operating the site in accordance with state regulations for land disposal of septage. The State regulates the location, application, loading rates, and maintenance of the site to protect the health of the community, and to prevent drinking water contamination. Alternatively, disposal may be accomplished at a sewage treatment plant, as in the case of Saco. The City has the responsibility to manage the disposal of septage to prevent upsets at the treatment plant and to protect the health and safety of its citizens from the possible hazards of such disposal.

2. Alternatives and Recommendations

The existing management agencies have the requisite authority to properly carry out the task of septage disposal. No management changes are recommended. However, thorough, uniform enforcement of State regulations should be pursued.

C. Impact Assessment

Use of treatment plant facilities as the means for septage disposal is an effective means of processing septage before ultimate disposal on land (as sludge). The improvements recommended in the point source plan regarding septage disposal will reduce the potential impact of the septage on the treatment plant operations. Processing of septage reduces the hazards associated with direct land application of septage; however, costs may be higher.

Sludge Disposal

A. Technical Considerations

1. Existing and Future Conditions

The City of Saco is served by three municipal treatment plants which generate an estimated combined annual sludge volume of 10,750 cubic yards. About 10,000 cubic yards are generated annually by the Factory Island treatment plant with most of the remainder originating from the Front Street plant, and a small amount being contributed by the industrial park plant on Route 112.

From chemical analysis of the Factory Island treatment plant sludge, it is apparent that the sludge has a relatively low nitrogen content and no reported bacterial content. The element of prime water quality concern is the water soluble chromium.

Sludge from the Saco treatment plants is currently being buried in a designated portion of the Saco sanitary landfill site located at the end of Foss Road. This method of disposal provides for sludge to be landfilled in the most well drained and remote to surface water areas of the site.

The site is predominately mapped as Windsor loamy sands. These soils are rated as acceptable for sludge spreading, but not acceptable for sludge burying. The sludge disposal site is currently under consideration for approval by the Maine Department of Environmental Protection.

From 1973 when the Factory Island Plant began operating, until the present sanitary landfill operation began, sludge was disposed of at the former Saco dump. The former site is located adjacent to the existing site on Foss Road. The sludge was either deposited on the ground surface or in shallow trenches, and only intermittently covered.

The Edward C. Jordan Company in a study directed at techniques for minimizing leachate problems from the abandoned disposal area determined surface and subsurface drainage to generally move in a southeasterly direction toward Sandy Brook, located approximately 300 feet away. A tributary to Sandy Brook lies between the site and the homes. Homes located approximately one half mile north on Buxton Road are separated from the site by Sandy Brook.

In a private water supply sampling program performed in conjunction with the 1975 E.C. Jordan Company report, chromium, believed to have originated from the tannery sludge, occurred at a peak concentration of 2.0 mg/l within and directly south of the site. On two occasions chromium concentrations in private wells located on Buxton Road were determined to exceed the U.S. Public Health Drinking Water Standard of 0.5 mg/l. Alterations with respect to drainage characteristics as recommended in the report should result in minimizing the effect of the disposal site on water quality.

2. Alternatives and Recommendations

Saco's three treatment plants combined generate approximately 11,000 cubic yards of dewatered sludge annually. In order to increase the efficiency of the sludge handling process and minimize any adverse effects from the disposal of the chromium-ladened sludge from the Factory Island treatment plant, the town's "201" consultant has recommended the construction of a sludge processing facility, to be built on a city-owned parcel of land located across from the tannery. Sludge from the City Proper treatment plant, the Factory Island treatment plant, and the proposed secondary treatment facility would be pumped to the proposed sludge dewatering facility. There the sludge would be dewatered on four belt presses, and then incinerated in a molten salt incinerator. This process would reduce the amount of sludge to be buried at the sanitary landfill and would facilitate the recycling of any chromium contained in the waste sludges. The incinerator may be sized with sufficient capacity to also process treatment plant sludges and refuse from surrounding towns. The ash would be buried at the Saco sanitary landfill (see the Non-Point Chapter of the Plan for information on the characteristics of the sludge and disposal site). Pilot plant studies are continuing to confirm the design criteria.

It is recommended that semi-annual monitoring of private water supplies in the immediate vicinity of the site be performed to determine whether contamination has occurred.

B. Management Considerations

1. Existing Conditions

The municipality is responsible for providing an approved sludge disposal site and operating the site in accordance with State regulations for land disposal of sludge. The State regulates the location of the site, application, loading rates, and maintenance of the site, to protect the health of the community, and to prevent drinking water contamination. Also, the municipality is responsible for managing the sludge processing system unless the Saco Tanning Company chooses to own and operate the system.

2. Alternatives and Recommendations

The existing management agencies have the requisite authority to properly carry out the task of sludge disposal. No management changes are recommended. However, thorough, uniform enforcement of State regulations should be pursued.

C. Impact Assessment

Pilot studies are on-going to determine the feasibility of using the proposed sludge incineration system, and to quantify costs and the air quality impact of the system. The summary Impact Assessment Matrix assesses the impact of sludge disposal in a qualitative manner.

Because of the chromium content of the majority of Saco's sludge (from Factory Island treatment plant), there are environmental hazards associated with any disposal method selected. Land disposal of the chromium-laden sludge presents a threat to surface waters and groundwaters, particularly because of the lack of suitable soil for such disposal. Use of incineration as a means of processing the sludge tends to reduce the potential water quality impact; however, chromium that may be vaporized and released to the atmosphere during incineration presents an adverse air quality impact and possible health related impacts.

An advantage of the incineration process is that it provides the opportunity to recycle the chromium, substantially reducing the chromium content of the materials that require disposal. Disadvantages of incineration are the high capital, operation, and maintenance costs of the system. Recycling chromium may provide revenues to partially offset these high costs.

Composting sludge, normally a viable and potentially cost-effective processing method, is not a suitable method of returning the sludge to the land because of the potential heavy metal contamination of soils, plants, and food chains.

Solid Waste Disposal

A. Technical Considerations

1. Existing and Future Conditions

The Saco disposal site is located on the Foss Road, approximately 3 miles from the center of town. It was opened in 1974, and at the present time has an anticipated life of 5 - 7 years. Saco generates approximately 16,000 tons of refuse per year, or 36,500 cubic yards. Industry contributes approximately 15,500 cubic yards of this. Tannery and municipal wastewater sludges are also disposed of at the site. The site is 300 feet from Sandy Brook and is well secluded and removed from residences. Operation of the landfill is in accordance with DEP operating criteria. The abandoned Saco dump is located across Sandy Brook from the present site.

Soils found around the disposal sites are derived from glacial outwash and recent alluvial materials. Although these soils do not meet DEP criteria for soil suitability, no groundwater has been detected at the present disposal area, and no apparent problems with leachate have developed to date. The abandoned area, however, often had refuse and tannery sludge deposited directly into the groundwater. This has resulted in contamination of ground and surface waters to the southeast of the dump site. Vegetation in some areas has been killed. Tests of the contaminated water have found it to be high in chromium (from the tannery sludge) as well as the most common constituents of leachates. An intensive investigation of the area was undertaken by the City and work is under way to alleviate the problem. City water has been extended to residences along Buxton Road in the vicinity of the dump.

At the present time, Saco, along with Old Orchard Beach and Biddeford is evaluating an incineration with heat recovery system for solid waste disposal. Refer to the section on Old Orchard Beach, Solid Waste Disposal, for alternatives and recommendations, and management considerations.

Industrial Waste Disposal

A. Technical Considerations

1. Existing and Future Conditions

Seventeen of twenty-three industries in Saco are connected to public sewers and none currently provide pretreatment. Five industries discharge to the industrial park sewerage system and treatment plant, three to the Factory Island facility, and the remainder to the main sewerage system. Both Saco Tanning and Maremont Corporation presently utilize treatment facilities other than the City Proper plant. These two industries appear to be the only ones that would require significant pretreatment facilities before discharging to the City Proper plant. Wastes from most of the other industries are "sanitary" which do not require pretreatment. Saco Tanning discharges to the Factory Island facility which is discussed under "Sewage Disposal, Collection and Treatment Systems."

The NPDES discharge permit for the Maremont Corporation includes numerous parameters that require monitoring. Permit limits for contaminants are listed in the following Table which also contains risk levels for freshwater aquatic life and measured concentrations of contaminants.

TABLE 7

EFFLUENT FROM THE MAREMONT CORPORATION'S TREATMENT PLANT

PARAMETER	NPDES PERMIT LIMITS DAILY MAXIMUM mg/l	(lbs)	RECOMMENDED LEVELS* FOR AQUATIC LIFE (mg/l)	EFFLUENT SAMPLES** @ MAREMONT CORP. TREATMENT PLANT (mg/l	GOOSEFARE BROOK SAMPLES** @ ROSS ROAD (mg/l)
Cyanide	0.03	(0.25)	0.005	-	-
Chromium-Hexavalent	0.05	(0.42)	-	-	-
Chromium-Total	0.25	(2.1)	0.05	4.9 (3/3)	1.22 (6/6)
Zinc	0.3	(2.5)	96 hr. LC_{50}***=0.005	0.24 (1/3)	0.08 (0/6)
Manganese	1.0	(8.4)	-	0.62 (0/2)	0.36 (0/5)
Copper	0.05	(0.42)	96 hr. LC_{50} = 0.1	-	0.05 (0/2)
Nickel	0.8	(6.7)	96 hr. LC_{50} = 0.2	0.2 (0/2)	0.12 (0/4)
Aluminum	0.2	(1.7)	0.1	-	-
Lead	0.1	(0.84)	0.03	0.2 (1/1)	0.33 (4/4)
Oil and Grease	10.	(84)	Not visible on surface for emulsified oils 96 hr. LC_{50} = 0.05	-	-
BOD	3.0	-	-	10.7	.22
Stream Flow	-	-	-	-	1.5 MGD
Plant Flow	1.1 MGD	-	-	1.0 MGD	-

Notes: *From Water Quality Criteria - 1972
**Average sample values (number of times NPDES limit exceeded/number of samples taken)
***See text for discussion of 96 hr. LC_{50} level

Most toxic parameters do not have a definite recommended limit but instead state that the median lethal concentration, LC_{50}, be determined for the most sensitive freshwater fish species in a specified time period, usually 96 hours.

Limits of pollutants have not been included for recreation or public water supply inasmuch as Goosefare Brook's "C" classification at the point of Maremont Corporation's discharge does not include these two uses and based on the available data, Goosefare Brook is not now even a suitable environment for aquatic life.

The limits set by the NPDES permit for cyanide, total chromium, copper, and nickel all exceed the recommended levels for aquatic life. Sampling (in 1976) on the treatment plant's effluent also revealed violations of NPDES permit limits for total chromium, zinc, and lead. For total chromium all three samples exceeded the limit, while for zinc one out of three, and for lead one out of one were excessive.

Maremont has reduced the amounts of chromium reaching their treatment plant by recovery at the source (the production line) using evaporative and ion exchange recovery systems. The company has also removed non-contact cooling water from the plant, thus reducing the average daily flow from 1.1 MGD to 0.72 MGD.

Samples taken from Goosefare Brook at Ross Road, downstream from Maremont Corporation, also revealed extremely high chromium and lead concentrations.

2. Alternatives and Recommendations

During low-flow periods the upper reaches of the Goosefare Brook consists primarily of effluent from Maremont (average daily flow from Maremont is now about 720,000 gpd (1.1 cfs) flow above the Maremont outfall on one day in July 1973 was estimated to be 0.3 cfs.* In order to obtain a "B" classification of Goosefare Brook, the Maremont effluent would have to be eliminated. However, if Maremont were to discharge pretreated wastewater to the City Proper system, a number of questions arise:

1. What effect would the additional heavy metals load have on the Saco River?
2. What effect would significant industrial cost recovery and sewer use charges have on Maremont and possibly the City?

The proposal by the University of Maine to examine the little known effects of chromium in the Saco River would help to resolve the first question. (Hopefully, the study could be expanded to cover other heavy metals.)

From a water quality standpoint, one must ask, do you potentially sacrifice one river so that another can meet water quality standards or do you potentially degrade two rivers with water quality consequences not as severe as if all heavy metals were discharged to the Saco River? However, the question is not even as simplistic as this.

Assuming that the addition of heavy metals from Maremont would not cause a severe problem in the Saco River, how will the City of Saco

*Goosefare Brook 1973 Water Quality Study, Maine DEP

assess the Maremont Corporation for discharging 0.72 MGD of wastewater? Although BOD and SS are not significant, hydraulically, Maremont's flow would be a significant part of the total flow received at the City Proper facility.

According to EPA industrial cost recovery regulations, Maremont would have to pay their fair share of the capital cost* of the City Proper treatment facility expansion plus a user fee to cover operation-maintenance costs. What effects would this additional cost of handling the wastewater (pretreatment would also be required before discharge to the City system) have on the City's largest employer?

From an economic viewpoint it would appear that Maremont should continue discharging to Goosefare Brook, reduce the level of heavy metals discharged (including reduction at the source--at the process line) and eliminate roof drains and surface water runoff from their treatment facility. From a water quality viewpoint, the decision to sewer Maremont to the expanded City Proper facility should await a detailed study, such as proposed by the University of Maine, of the effects of chromium in the Saco estuary. Hopefully, the study could be expanded to include other heavy metals.

With the upgrading of the existing treatment facility and discharging of "pretreated" wastewater to the City Proper facility, a discharge license for Saco Tanning facility will no longer be required.

City officials should make periodic site visits to other industries in the City to view operations and if necessary require that a waste analysis be performed.

B. Management Considerations

1. Existing Conditions

Controls are established and administered by sewer districts or municipalities if the industry discharges into the sewer system. Direct discharges into receiving water bodies are regulated through the NPDES permit system.

2. Alternatives and Recommmendations

Administration of controls on industrial waste discharge to municipal and sewerage systems should remain with the existing management agencies. Enforcement of pretreatment standards and other requirements should be improved by establishing adequate sewer use ordinances and industrial waste survey programs as described in the Plan.

As part of the Federal involvement in water pollution abatement activities, funding programs should be expanded to research of heavy metal effects on riverine and estuarine environments. The State role in water quality sampling should be expanded to include adequate monitoring of discharges of toxic pollutants.

*Maremont would contribute approximately 20% of the design flow and could pay approximately $760,000 as their "fair share" of the capital cost of the City Proper treatment facility. This would be in addition to their present treatment costs.

C. Impact Assessment

The existing discharges from Saco Tanning and Maremont Corporation have a significant, adverse impact on the water quality of the Goosefare Brook and Saco River estuary. Some of the impacts of these discharges have been noted in the above discussions (see also, Sewage Disposal - Collection and Treatment Systems). Further study will be required before deciding whether to connect Maremont to the public sewer system and what the heavy metals impacts are on the Saco River estuary and Goosefare Brook.

Runoff from Development

A. Technical Considerations

1. Existing and Future Conditions

Ten natural drainage areas were identified by the City's consultant in the 201 Facility Plan. The area presently sewered is considered to comprise the "urban" area of Saco. Runoff from the majority of the town flows to channels tributary to the Saco River. Runoff from the northeastern corner of the town flows to Bear Brook which is tributary to Goosefare Brook.

The bulk of urban Saco's stormwater runoff is collected, conveyed and discharged through a system of separated storm and combined sewers. The sewer system is described in the Plan.

Little information is available concerning Saco's existing storm sewer system. A 1973 system map by Dow and Coulombe, Inc., identified 6 comparatively small systems with discharge to the Saco River. Information concerning the condition of these systems or the existence of sanitary connections into the system was unavailable. No operational problems were identified in the Facility Plan, nor were there any significant drainage problems identified.

Saco's combined sewer system has insufficient capacity to convey all flows during storm events. For this reason, numerous relief, by-pass, or overflow points have been developed which allow untreated combined sewer flows to be discharged to natural watercourses or drainage channels.

Some deposition and clogging problems were alluded to in the Facility Plan. The designs and operational characteristics of these sewer structures, as well as actual discharges from them, are discussed further in the appended bypass/overflow report in the Plan.

The 201 Facility Plan indicates that 0.04 billion gallons of inflow (stormwater) enters Saco's combined sewer system each year. At 50 storm events per year, this would mean some 0.8 million gallons of runoff would enter the combined system during an average storm event. The remaining runoff is removed through urban storm sewers or urban overland runoff. Given this assumption, flows and loadings from all urban area runoff, including areas not served by storm sewers were calculated and are given below.

STORMWATER RUNOFF - FLOWS AND LOADS PER WEEKLY STORM EVENT

Receiving Stream	Drainage Area (acres)	Discharge (Million Gal.)	BOD_5 (lbs.)	SS (lbs)	N (lbs)	P (lbs)	Fecal Coliform (MPN)
Saco River	730	2.5	640	13,000	64	21	3.9×10^{12}
Goosefare Brook	315	1.0	260	5,500	26	9	1.6×10^{12}

COMBINED SEWER OVERFLOWS PER WEEKLY STORM EVENT (Discharge to Saco River)

Discharge Million (Gal.)	BOD_5 (lbs)	SS (lbs)	N (lbs)	P (lbs)	Fecal Coliform (MPB)
0.54	520	1,800	50	18	4.1×10^{13}

2. Alternatives and Recommendations

Stormwater planning will be especially important and beneficial in those areas projected to experience the greatest growth, such as the area between the CBD and the Turnpike and along Ferry Road. Development within these areas should acknowledge the desirability of reducing storm flows to conduits and surface waters such as the Elm - Scammon storm sewer and the stream in the Lincoln Street - Harrison Avenue area. Such planning should also be applied to the development of industrial facilities proposed in that section of this area tributary to Goosefare Brook.

Runoff from "The Heath", a large wetland area to the north of the urbanized area, should not discharge through the Saco urban area. The potential for the excavation of peat in this area is recognized. It is recommended that the stormwater retention capacity of this area be preserved and that the effects of peat excavation upon the quantity and quality of runoff to Deep, Cascade, and Goosefare Brooks be carefully evaluated before any encouragement is given to the exploitation of this peat bog.

Estimated total stormwater discharges and associated contaminant loadings, both present and future, are presented in the Plan. Development within coastal wetlands should be carefully monitored. Uncontrolled coastal development within wetland areas has, historically, often given rise to severe drainage problems.

The 1976 Facility Plan by the City's consultant concluded that the most cost-effective program for the minimization of combined sewer overflows would be an integrated plan which included:

- System separation to remove inflow and infiltration (as cost-effective);
- Construction of a chlorine detention tank for stormwater overflows at the City Proper wastewater treatment;
- Continued use of the Imhoff tank at the Bear Brook Pumping Station as a stormwater storage facility.

This plan gives high priority to the separation of those combined sewers which have high storm and stream inflow (e.g., the "Elm - Scammon" sewer) and therefore, are directly responsible for the most frequent overflows.

Although not directly stated, it appeared from the Facility Plan, that combined sewer overflows into the Saco River would be precluded by the "Phase 1" improvements recommended in the Facility Plan. The Plan, does however, suggest that overflows would occur some 1.5 times per year at the Bear Brook storage, pumping Facility even with the adoption of the proposed improvements.

The Plan did not find total separation to be cost-effective. However, no cost analysis of a total separation scheme and associated changes in pumping and treatment facility was presented, nor could a realistic assessment of this alternative, as a means of bypass, overflow control, be made based upon information available in the Plan.

It is suggested that complete separation rehabilitation in the areas tributary to the Bear Brook pumping station be given detailed consideration given the potential unacceptability of even infrequent overflows and the apparently small additional area which would have to be separated.

Given the acceptance of the limited separation scheme proposed in the Plan, the isolation of the principal sources of inflow (as outlined in the Plan's separation scheme and shown in Appendix D) should be given the highest priority.

B. Management Considerations

1. Existing Conditions

The primary responsibility for controlling storm water runoff rests with the municipality.

2. Alternatives and Recommendations

Runoff from development can be limited by local codes and ordinances such as subdivision regulations and zoning ordinance performance standards. Additionally, the State Site Location Law requires erosion and sediment control plans for new development. The existing management agencies have adequate authority to control runoff. The Town has the authority to regulate the use of land to limit runoff and the local treatment authority has the power to control collected runoff. Therefore, no institutional changes are recommended. However, to improve controls to limit runoff municipalities are urged to review, modify and adopt the model subdivision regulations and zoning ordinance performance standards included in the Plan

A technical review team should be funded through federal, state, and local sources, to assist the municipality in establishing ordinances and in the review of proposed developments.

C. Impact Assessment

Several of the technical recommendations relate to controlling stormwater runoff and drainage through utilization of the natural capability of soil adjacent to development. This may be achieved through the recommended ordinances, of which the essential purpose is to minimize the increase of runoff from developed lands, attempting to maintain to the extent possible

the natural runoff conditions. This action will tend to eliminate storm related discharges to surface waters and reduce the potential for flooding. Controlling stormwater runoff at the source will decrease the demand for expensive collection and transport facilities.

A secondary impact of the implementation of the ordinances will be increased land development costs.

The other technical recommendations related to controlling and minimizing combined sewer overflows to the Saco River and Goosefare Brook. Minimizing combined sewer overflows will reduce the impacts on water quality from the combined raw wastewater and stormwater discharge. Bacteria, BOD, and suspended solids will be proportionately reduced according to the efficiency of controls applied. Approximate costs for control of combined sewer overflows are described in the Facility Plan for the City.

Runoff from Agriculture

A. Technical Considerations

1. Existing and Future Conditions

The land use/land cover map indicates there are about 30,000 acres in agricultural use in the 208 area (12.9% of the land area). Only 10,000 acres are under intensive farming as cropland, the rest being open pasture or hay fields. The Soil Conservation Service has estimated that 66% of the farms are operated under the guidance of Conservation Plans designed to limit soil loss from the land. Because of this, the erosion and sedimentation problems associated with agricultural land use and the potential water quality impact of runoff from these lands is considered minor for this region.

2. Alternatives and Recommendations

Structural controls to minimize agricultural runoff must be applied on a site specific basis. The Soil Conservation Service's recommended agricultural practices and controls for soil loss developed through Conservation Plans are sufficient to protect water quality in this region. Nonstructural control recommendations are in the Land Use Chapter of the Plan as locally enforced Performance Standards (see Management Considerations below).

B. Management Considerations

1. Existing Conditions

Municipalities have the authority to manage land use controls. The Saco River Corridor Commission manages the land within 1000 feet of the Saco River. Voluntary USDA programs are administered by S.C.S. and A.S.C.S. The federal programs offer technical and financial assistance to farmers to control soil loss.

2. Alternatives and Recommendations

Funding of USDA programs should be continued. Additional money should be channeled into the A.S.C.S. Program and the $2500 cut-off per project should be raised.

Municipalities should review, revise and adopt appropriate versions of the Model Performance Standards for control of runoff and soil loss. A technical review team should be funded by federal, state, and local sources to assist the municipality in the establishing of ordinances and in the review of proposed developments.

C. Impact Assessment

The essential purpose of the recommended ordinances is to minimize the increase of runoff from agricultural lands attempting to maintain to the extent possible the natural runoff conditions. This action will tend to eliminate storm related discharges to surface waters and reduce the potential for flooding.

A secondary impact of the implementation of these ordinances will be increased costs of agricultural land use.

Salt Storage and Application

A. Technical Considerations

1. Existing and Future Conditions

Salt (sodium chloride) is used in Southern Maine to achieve bare pavement conditions during the winter months. Salt will continue to be used as long as the bare pavement policy is mandated and other highway de-icing chemicals are not used because of their prohibitive cost. Surface water quality problems have not been associated with highway de-icing salt uses. However, a small number of individual water supplies have been found to exceed chloride standards.

2. Alternatives and Recommendations

Since use of highway de-icing salt compounds will continue, general guidelines have been presented for the storage, handling and application of these compounds. These guidelines are sensitive to the conflicting policies of bare pavements in winter and clean water and attempt to strike a balance between the two.

B. Management Considerations

1. Existing Conditions

The State and municipalities have the authority and responsibility to maintain roads and highways in the region. The State has established guidelines and procedures for highway de-icing salt storage and application, and has developed educational and training programs for local operators.

2. Alternatives and Recommendations

Existing Maine laws should be investigated for enforcement powers related to regulate the use of highway de-icing compounds. In the absence of enforceable regulations and state level standards adequate to protection of the environment and compatible with policies related to winter driving conditions, MDEP, MDOT and the other agencies should collaborate on their development. This program development should include a series of checks and balances through required reporting, surveillance and/or sampling, and analysis.

C. Impact Assessment

Continued use of highway de-icing salt for road maintenance in the winter months will present a potential threat to surface and groundwater quality. Following recommended practices for storage and application of the salt will minimize the potential for water quality degradation while maintaining bare pavement policy. These practices may tend to increase the costs of providing facilities for salt storage; however, costs may be partially offset by the resulting conservation of salt.

Runoff from Construction Activities

A. Technical Considerations

1. Existing and Future Conditions

Because of the need to remove the cover vegetation and leave areas exposed during many construction projects, the potential for erosion and sedimentation is great. The soil loss can be extensive and can result in significant degradation of surface water through sedimentation and siltation. Since population projections indicate continued growth and development, construction activities will remain a potential source of water pollution.

2. Alternatives and Recommendations

Since erosion and sedimentation in the study area is principally site specific, each situation or occurrence must be considered in relationship to its own setting. The two major factors to be considered in erosion and sediment control are:

a. Reduction of the raindrop impact energy which reduces its dispersing and eroding power below the critical force and

b. Reduction of the velocity of the surface runoff which, in turn, lessens its abrading power and transporting capacity.

Probably the most effective method of reducing the impact energy of raindrops are those procedures which cover the soil; e.g., natural plant cover, mulching, temporary cover crops and paving or covering with non-erodable materials. If the precipitation falling on the site is not allowed to pick up velocity as it runs off then its erosive power is curtained. Shortening the length of slope is one of the most effective methods of controlling runoff velocities. This shortening can be accomplished by various techniques such as structural measures, cropping or management patterns, or tillage practices.

It is recommended that the most cost-effective manner of instituting methods for controlling runoff from construction activities is through local land use regulatory controls.

B. Management Considerations

1. Existing Conditions

Construction controls are implemented at all levels. The Federal government imposes controls through the Federal Highway Administration, and the Corps' activities. The State imposes controls through the Site Location Law, the Great Ponds Law, the Wetlands Act, Stream Bulldozing

and Mandatory Shoreland Zoning. The Saco River Corridor Commission imposes controls on construction activities. Local controls are imposed through subdivision and zoning regulation.

2. Alternatives and Recommendations

Since the requisite legal authority to regulate construction activities exist, no institutional change is recommended. Municipalities should review, revise, and adopt appropriate versions of the Model Performance Standards for control of runoff and soil loss.

A technical review team should be funded by Federal, State, and local sources to assist the municipality in the establishment of ordinances and in the review of proposed developments.

C. Impact Assessment

The essential purpose of the recommended ordinances is to minimize the increase of runoff from agricultural lands, attempting to maintain to the extent possible the natural runoff conditions. This action will tend to eliminate storm related discharges to surface waters that may adversely affect water quality.

A secondary impact of the implementation of these ordinances could be increased costs for agricultural activities.

Petroleum Storage and Transfer

A. Technical Considerations

1. Existing and Future Conditions

From the evidence there is no question that petroleum products have the potential to contaminate water resources in the SMRPC 208 area. Furthermore, with the potential for more than 31 million gallons of #2 home heating fuel transferred in over 150,000 transactions and with over 16 million gallons of storage capacity within the 208 area, substantial opportunity for similar oil pollution will continue to exist for the foreseeable future. Assuming little change in present technological and other controls, spills and leaks will likely culminate in local long-term environmental degradation with little or no opportunity for corrective action.

Boating activity (specifically exhaust emissions) may not cause major adverse effects on lakes; however, support facilities (e.g., marinas selling oil and fuel and doing repair work), accidents, and negligence in the handling of petroleum products may degrade water quality.

2. Alternatives and Recommendations

This planning effort did not address the large amount of technical control methods for the handling and distribution of petroleum products.

B. Management

1. Existing Conditions

Petroleum storage and transfer are currently managed by Federal, State and local governments. The Federal and State governments primarily regulate water transport, large on-land storage facilities, and discharge to groundwaters and surface waters. Local governments have the authority to control the siting of soil storage facilities adjacent to water bodies.

2. Alternatives and Recommendations

A State level program designed to identify the magnitude of petroleum related pollution should be developed. Applicable controls should be recommended and incorporated into legislative and regulatory programs. Local and regional input should be sought by the State in the design and implementation of the program.

C. Impact Assessment

As long as substantial volumes of petroleum products are handled, stored, transferred and consumed in the SMRPC 208 area, contamination of water resources is likely to continue. Assuming little change in present technological and management controls, spills and leaks will likely culminate in local long-term environmental degradation with little or no opportunity for corrective action.

SOUTHERN MAINE REGIONAL PLANNING COMMISSION
AREAWIDE WASTE TREATMENT MANAGEMENT PLAN

IMPACT ASSESSMENT MATRIX SACO

LEGEND
- VERY NEGATIVE
- NEGATIVE
- NO IMPACT
- POSITIVE
- VERY POSITIVE

FACTORS IMPACTED

NATURAL FACTORS: LAND; SURFACE WATERS; GROUNDWATER; AIR; FLORA; FAUNA

CULTURAL FACTORS: LAND USE; Recreation; SOCIAL; ECONOMIC

COST COMPARISON

TECHNICAL & MANAGEMENT ALTERNATIVES			SOIL	UNIQUE PHYSICAL FEATURES	DISSOLVED OXYGEN	BIOLOGICAL OXYGEN DEMAND	SUSPENDED SOLIDS	NUTRIENTS	DRINKING WATER SUPPLY	TEMPERATURE	TURBIDITY	BACTERIA & VIRUSES	Toxic Substances & Heavy Metals	CHLORIDES	NITRATES	PHOSPHATES	HEAVY METALS	BATERIA & VIRUSES	DRINKING WATER SUPPLY	PARTICULATES	NITROGEN OXIDES	SULFUR OXIDES	TOXIC SUBSTANCES	NATURAL VEGETATION	MANAGED VEGETATION	AQUATIC VEGETATION	BIRDS	LAND ANIMALS	FISH & SHELLFISH	FOOD CHAINS	Open Space, Wetlands, Forest	AGRICULTURAL	RESIDENTIAL	COMMERCIAL	INDUSTRIAL	FISHING	WATER RECREATION	POPULATION GROWTH	DEVELOPMENT PATTERN	EMPLOYMENT	HEALTH & SAFETY	INSTITUTIONS	WATER SUPPLY	RECREATION	FISHING	MANUFACTURING	CAPITAL COST	Operation/Maintenance Cost
WASTE SOURCES																																																	
SEWAGE DISPOSAL COLLECTION & TREATMENT SYSTEMS	Treatment Alternatives	NO ACTION			■	■	■	■			■	■	■																■				■	■						■									
		UPGRADE FACTORY ISLAND PRIMARY FACILITY																																		■	■										■	■
		UPGRADE CITY PROPER SECONDARY FACILITY			■	■	■	■			■	■			■	■		■															■	■														
		NEW STP ADJACENT TO CITY PROPER			■	■	■	■			■	■			■	■		■															■	■														
		NEW STP AT FERRY BEACH													■	■		■															■	■		■												■	■
	Regional Alternatives																																																
	Sewer Extensions	TO SACO COASTAL													■	■		■															■	■			■	■							■	■		■	■
		TO INDUSTRIAL PARK & MIDDLE SCHOOL																															■	■			■	■										■	■
		TO MAREMONT																															■	■			■	■										■	■
	Management Alternatives	USE EXISTING AUTHORITY																																								■							
		DEVELOP NEW AUTHORITY																																															
SEWAGE DISPOSAL SUBSURFACE SYSTEMS	Treatment Disposal Systems	SUBSURFACE WASTE DISPOSAL																															■	■			■	■		■								
		ALTERNATIVE TOILETS													■	■		■							■									■				■							■				
		SEWER EXTENSIONS													■	■		■															■	■			■	■			■				■		■	■	■
	Management Alternatives	USE EXISTING AUTHORITY																																															
		STRICT CODE ENFORCEMENT													■	■		■														■					■				■								
		MAINTENANCE PROGRAM													■	■		■																			■				■								
		REGIONAL CODE MANAGEMENT																																															■
SEPTAGE DISPOSAL	Disposal Methods	NO ACTION																																															■
		TREATMENT PLANT																																															
		LAND APPLICATION																																															
		INCINERATION																																															
	Management Activities	USE EXISTING AUTHORITY																																															
		REGIONALIZATION																																															■
SLUDGE DISPOSAL	Disposal Methods	NO ACTION	■												■	■	■	■																							■		■							
		LAND APPLICATION	■													■			■	■																														
		INCINERATION	■												■	■	■	■	■	■																														■
		COMPOSTING	■																																														
	Management Alternatives	USE EXISTING AUTHORITY																																															
		REGIONALIZATION																																															■
SOLID WASTE DISPOSAL	Disposal Methods	NO ACTION	■								■	■			■	■	■	■													■																		
		SOURCE SEPARATION	■								■	■			■	■	■	■													■								■							■		■	
		BAILING OR SHREDDING																																														■	■
		INCINERATION	■								■	■			■	■	■	■													■															■		■	■
		INCINERATION WITH HEAT RECOVERY	■								■	■			■	■	■	■													■																		
		SANITARY LANDFILL																																															
	Management Alternatives	USE EXISTING AUTHORITY																																															
		REGIONALIZATION																																															■

BIDDEFORD

WASTE SOURCES ADDRESSED	PRIORITY*
SEWAGE DISPOSAL - COLLECTION AND TREATMENT SYSTEMS	●
SEWAGE DISPOSAL - SUBSURFACE SYSTEMS	◉
SEPTAGE DISPOSAL	◉
SLUDGE DISPOSAL	◉
SOLID WASTE DISPOSAL	●
INDUSTRIAL WASTE DISPOSAL	⊕
RUNOFF FROM DEVELOPMENT	◉
RUNOFF FROM AGRICULTURE	⊕
SALT STORAGE AND APPLICATION	⊕
RUNOFF FROM CONSTRUCTION ACTIVITIES	⊕
PETROLEUM STORAGE AND TRANSFER	⊕

Sewage Disposal - Collection and Treatment Systems

A. Technical Considerations

1. Existing and Future Conditions

The City of Biddeford's sewerage system consists of about 12 miles of separate sanitary sewers, 22 miles of combined sewers carrying both sanitary sewage and stormwater runoff, and 4.5 miles of separate storm sewers. Although the City has a total area of 20.3 square miles, only about 3.9 square miles in the most heavily urbanized center of Biddeford plus parts of the Biddeford Pool area are served by sewage collection systems.

The existing sewer system of Biddeford is basically a combined system. The combining of sanitary and storm flows has overtaxed the capacity of the treatment plant and has meant that, at times, combined sewage flows must be discharged untreated to the Saco River.** Variations in industrial waste loads, coupled with the limitations of fixed-speed pumps at the Horrigan's Court station (through which such discharges must pass), has been one other factor straining the capacity of the treatment plant and associated facilities. Most of the recently built sewers in the City are separate sewers--or they could be separated relatively easily. Efforts continue to separate sanitary flows from the stormwater flows in older combined sewers; this is in furtherance of the recommendation by the City's consultants that this is a cost-effective solution to present problems. Much of the Southeastern side of the City, for example, now has separate sewer systems.

* ● HIGH PRIORITY ◉ PRIORITY ⊕ LOW PRIORITY

**Overflows at the treatment plant are now chlorinated.

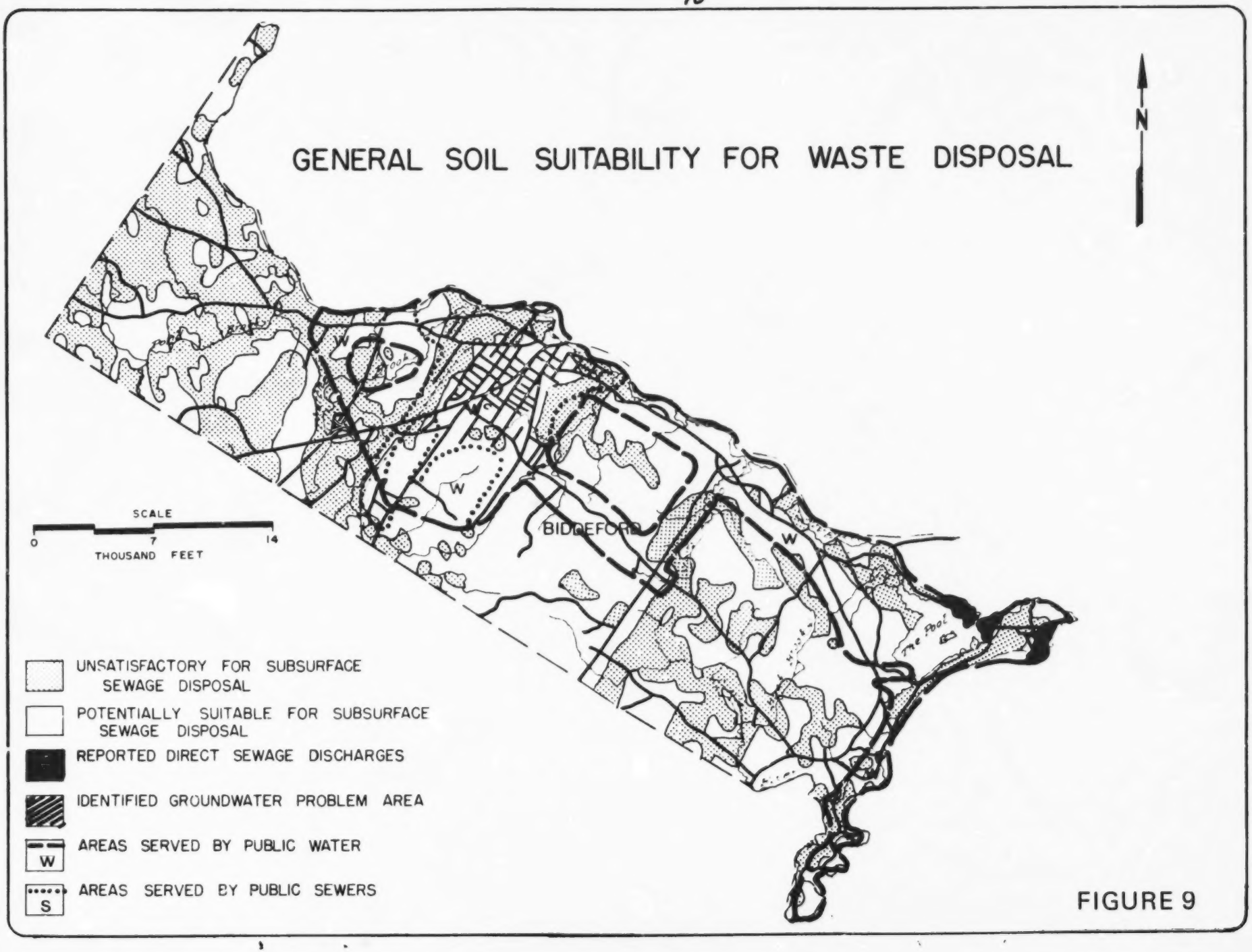

GENERAL SOIL SUITABILITY FOR WASTE DISPOSAL
N
SCALE
0
7
14
THOUSAND FEET
BIDDEFORD
W
W
W
UNSATISFACTORY FOR SUBSURFACE SEWAGE DISPOSAL
POTENTIALLY SUITABLE FOR SUBSURFACE SEWAGE DISPOSAL
REPORTED DIRECT SEWAGE DISCHARGES
IDENTIFIED GROUNDWATER PROBLEM AREA
AREAS SERVED BY PUBLIC WATER
W
AREAS SERVED BY PUBLIC SEWERS
S

FIGURE 9

Expansion of the City's high density urban area at its periphery is already occuring and this, in turn, suggests that sanitary sewers be extended to serve these newly developed areas. In addition, pressures are mounting in outlying areas (such as Fortune's Rocks, Biddeford Pool and Guinea Corner) for municipal sewage collection facilities which might tie in with the system already installed in the urban part of the City. Moors Brook, for example, is believed to be carrying septic tank leachate from the Guinea Corner area into the Saco River where this effluent further degrades the water quality of that river.

In conjunction with recent evaluation studies of the sewerage system has been the consideration of expansion of the sewage treatment plant so as to be able to treat combined flows. The related alternative--building interceptors to carry intercepted overflows of combined sewers, is also being considered.

The Biddeford Wastewater Treatment Plant, licensed by NPDES Permit No. ME0100048, Maine waste discharge license #683, employs the activated sludge process. The plant has been operational since 1965; unit processes and operations include: screening, comminution, grit removal, aeration, final clarification, and chlorination. The effluent is discharged to the Saco River, a class SC waterway.

The plant is designed to treat an average flow of 2.64 MGD; the average daily flow is actually about 2.29 MGD. The plant services a combined sewerage system; bypassing occurs about 4 times a month. Industrial flows, mostly from local textile mills, average about 0.8 MGD.

Influent BOD concentrations average 196 mg/l while influent total suspended solids concentrations average 101 mg/l. Corresponding effluent values are: 33 mg/l and 34 mg/l respectively; removal efficiencies average 83% for BOD and 66% for total suspended solids. Effluent fecal coliform counts average 153/100 ml. The City's discharge permit requires the average monthly BOD and SS effluent concentrations to be no more than 30 mg/l, and fecal coliform counts of no more than 15 colonies per 100 ml. An inoperable sludge return pump and slug loads from industries were largely responsible for the facility not meeting the discharge permit.

The plant produces approximately 1,750 cubic yards of dewatered sludge annually. The sludge is processed by a flotation thickener and dewatered on a vacuum filter before disposal at an abandoned borrow pit adjacent to the town dump.

The City's consultant, in a December, 1974, report identified several problem areas and recommended certain improvements to the plant.

2. Alternatives and Recommendations

A number of near-term extensions to the sewerage system are recommended. The first of these is on Pool Road and the area near Gordon Point. Combined sewers and sanitary sewers on Pool Road discharge to West Brook. The industrial park west of the airport is an area that the City plans to sewer in the near future. It is recommended that inclusion of additional industrial process waters (other than sanitary wastes) be carefully evaluated in view of the problems with heavy metals in the

Saco River and the hydraulic overloads which occur now at the treatment plant during wet weather. Additional flows would increase the volume of combined sewer overflows and bypasses to the Saco River. Estimated cost of these near-term extensions is $950,000.

Other potential extensions of lower priority include the area around Greenwood Cemetery the westerly end of Main Street and Pool Road out to St. Andres Hospital.

A public sewerage system on Biddeford Pool including a treatment facility, pumping station and sewers would cost approximately $4.8 million or close to $7,000 per house served. On-site systems utilizing septic tank-sand filter and chlorination would cost less than half that of the public system. A major concern is the elimination of the raw point discharges of wastewater from the limited collection system on the "Pool" which serves an estimated 25 homes. Homes connected to this system could install one of the above mentioned on-site systems serving each home or groups of homes and then discharge the chlorinated effluent to the existing collection system.

In lieu of a public treatment facility it appears that St. Francis College could also add a sand filter to their system, chlorinate the effluent, and thus satisfy the State requirements for treatment of their wastewater.

There is no available detailed information on infiltration in the Biddeford wastewater collection system. At some point in the near future the City should have a detailed study conducted to develop a long-range program for rehabilitation of sewers. Other work, such as correction of combined sewer overflows appears to have a higher priority.

The City of Biddeford has two "High Priority" treatment needs:

a) improving the operation of the existing secondary treatment plant
b) elimination of direct discharges to the ocean in the Biddeford Pool area

and needs of a less pressing nature:

a) providing treatment (and perhaps collection) for sewage in the areas of Biddeford Pool now serviced by subsurface disposal systems;
b) expanding the existing secondary treatment plant, perhaps by 1985, in response to increased domestic or industrial hydraulic loadings.

The efficiency of the existing treatment facility is seriously hampered by several problems, including hydraulic overloads. The City should continue to implement the recommendations contained in the December, 1974, E. C. Jordan report. If not already begun, the City should also consider funding a detailed infiltration/inflow analysis (sewer system evaluation survey) of the sewerage system. Decreasing the amount of extraneous water reaching the plant will increase treatment efficiency and will release treatment plant capacity for increased domestic or

industrial loadings. The time when the plant requires expansion may then be postponed.

The design capacity of the existing treatment facility may be exceeded by 1995. This projection is, however, based on an estimated increase in population of 3,000, an average daily per capita sewage discharge of 80 gallons and an allowance of 120,000 gallons per day for industrial or commercial growth. As mentioned previously, eliminating excessive infiltration or inflow from the sewerage system, thereby increasing plant "capacity" for future domestic or industrial loadings, may postpone the need for expansion beyond 1995. Conversely, the entire 120,000 gallon industrial allotment could be used up by one large water using industry, necessitating expansion of the plant before 1995. In either case, the City would have an alternative to expansion; diversion of all flows from Biddeford or just those flows in excess of the capacity of the Biddeford treatment facility to the proposed Saco secondary facility. The flows would probably be pumped across the Factory Island bridge to the Saco sewerage system.

In summary, the capacity of the Biddeford treatment facility may be exceeded by the year 1995. However, because of the uncertainties as to exactly when the capacity will be exceeded, the amount of treatment plant capacity now unnecessarily tied up by excessive infiltration and inflow and the type of technology that might be available five, ten or fifteen years from now to expand the plant, the city should take no actions involving construction of additional facilities at this time including contracting with Saco for any portion of Saco's proposed secondary facility. Biddeford may wish to reserve some land at the proposed secondary plant and design the plant to facilitate expansion should Biddeford require capacity at the Saco facility. When the capacity is exceeded, Biddeford should then determine if it would be cheaper to expand the existing plant or convey to the Saco treatment plant all the sewage from Biddeford or just that portion of the flow exceeding the capacity of the existing Biddeford plant.

Constructing a conventional sewerage system in Biddeford Pool may cost as much as $4,800,000 including gravity sewers, force mains, pump stations and a secondary treatment plant. (Regional treatment for Biddeford Pool sewage is not cost effective, see Chapter III, Point Source Controls for the details.) The construction cost for each serviced dwelling unit may then be about $6,800.

Only within the last year or two has the U.S. Environmental Protection Agency encouraged the consideration of smaller, decentralized sewage treatment systems. One alternative that may be suitable for the Biddeford Pool area, particularly those homes now discharging raw sewage directly to the ocean through the public outfalls, is the septic tank-sand filter-chlorination system. Effluent from a septic tank is conveyed to a sand filter for additional BOD and suspended solids removal and is then disinfected, usually by dry chlorine compounds, before discharge to a watercourse. With proper operation and maintenance, the system can consistently produce an effluent meeting Federal discharge limitations. In order for the systems to be eligible for state and federal aid, it must:

a. be owned, operated, monitored, and maintained by the city.
b. be located on public property or on land where easements provide the municipality the right to construct, operate, monitor, and maintain the facility.
c. serve a group of users (systems serving only an individual home are not eligible).

As detailed in the recently completed Biddeford Pool Facilities Plan, the city should consider providing decentralized sewerage systems for those homes presently connected to the public sewers in the Biddeford Pool area. The immediate problem of complying with the Pool's NPDES permit compliance schedule will be solved without the necessity of constructing an expensive centralized treatment facility. The project, limited to about 25 homes, will also introduce the city to the responsibility of operating and maintaining decentralized treatment systems.

After the sewerage needs of the city proper area are met and the City can focus its attention and financial resources on Biddeford Pool, the city can then better decide, considering its experience with the decentralized systems servicing the 25 homes formerly discharging directly to the ocean, if the needs of the rest of the Pool area can be adequately met by decentralized systems.

In summary,

a. The city should construct decentralized sewage treatment systems for those homes now discharging sewage into the public sewers in the Biddeford Pool area.
b. Once the sewerage needs of the city proper area are met and the city is financially able to focus on the sewerage needs of the rest of Biddeford Pool, the city should consider either constructing additional decentralized facilities or, if the experience with the systems installed as previously recommended is not good, constructing a conventional collection and treatment system at a cost, in 1977 dollars, of $4,800,000.

It appears that the main concern with regard to upgrading the classification of the Saco River is reducing the level of coliform bacteria and toxic elements. Coliform bacterial from wastewater treatment sources can be handled without significant cost. However, toxic wastes are another matter. In order to meet SB-2 standards the following criteria must be met: (Portion of Maine DEP Standards for SB-2 waters)

There shall be no toxic wastes, deleterious substances, colored or other wastes or heated liquids discharged to waters of this classification either singly or in combination with other substances or wastes in such amounts or at such temperatures as to be injurious to edible fish or shellfish or to the culture or propagation thereof, or which in any manner shall adversely affect the flavor, color, odor or sanitary condition thereof; and otherwise none in sufficient amounts to make the waters unsafe or unsuitable for bathing or impair the waters for any other best usage as determined for the specific waters assigned to this class... There shall be no disposal of any matter or substance that contains chemical constituents which are harmful to humans, animal or aquatic life or which adversely affects any other water use in this class...

These waters shall be free of any matter or substance which alters the composition of bottom fauna, which adversely affects the physical or chemical nature of bottom material, or which interferes with the propogation of fish or shellfish if indigenous to this area.

No data is available on the concentration of heavy metals (lead, chromium, copper, zinc and nickel) from the Biddeford treatment facility. Wastes containing heavy metals are potentially "toxic" but the extent that they "adversely affect", or are "harmful to humans, animals or aquatic life" or "interfere with the propagation of fish or shellfish" is difficult to quantify. The study proposed by the State of Maine, mentioned previously, could help to determine what affects one of these elements, chromium, has on the ecosystem. It would appear to be beneficial to expand the study to include other so called "toxic wastes."

Summary of Recommendations

High priority should be given to elimination of combined sewer overflows. The sewer separation outlined by the City's consultant appears to be the most cost effective methodology for accomplishing this goal. This would ultimately eliminate the discharge of untreated wastewater to the Saco River and relieve the wet-weather hydraulic problems experienced at the treatment plant and within the existing collection system. Sufficient maintenance at some of the overflow points would also eliminate dry weather bypasses. Eventually, a detailed sewer system evaluation survey should be conducted to develop a program of rehabilitation of sewers to reduce infiltration to a cost-effective level. The City could also improve operation of its treatment facility by installation of variable speed pumps in key pump stations to insure a more uniform flow rate at the treatment plant and by requiring flow equalization at the two textile mills.

Elimination of direct discharges of untreated wastewater in Biddeford Pool should also be accomplished. Because of the high cost of collection/treatment facilities, it is recommended that those homes now connected to the collection system install on-site systems which would include a septic tank, sand filter and chlorination facilities. The effluent from these systems could then be discharged to the existing collection system.

B. Management Considerations

1. Existing Conditions

The City of Biddeford owns and operates the wastewater collection and treatment system in Biddeford.

2. Alternatives and Recommendations

The following management methods were considered and discussed in the management section of the 208 plan.

a. One single regional sewer district
b. County management of all facilities
c. Management by watershed
d. Management by sewer district for each population center
e. No change in the institutional arrangements

Although a single regional sewer district, county management, or other areawide/regional management agency would tend to reduce overall administrative costs and improve consistency in the provision of collection and treatment services, and establishment of such new agencies requires extensive, new legislative and institutional frameworks. Consequently implementation of a new authority may require a long period of time. Also, individual towns would have a reduced ability for self-determination regarding a town's desires for municipal services and population growth.

The analysis of these potential management agencies resulted in the conclusion that the existing cities, towns, and sewer districts have the authority to design, construct, and manage wastewater collection and treatment facilities. In addition, by minimizing institutional changes, the existing agencies and officials that have participated in the development of the Plan will likewise participate in the immediate implementation of the Plan. Therefore, existing management agencies should continue to design, construct, and manage wastewater collection and treatment systems.

C. Impact Assessment

The priority problem in Biddeford, for which the 208 Plan presents alternatives and recommendations, is the elimination of direct discharges of sewage in the Biddeford Pool area. Alternatives developed for the Biddeford Pool area are presented in detail in the Point Source Control Plan and have been summarized utilizing the assessment matrix for Biddeford.

Alternatives to eliminate the direct discharges at Biddeford Pool are:

a. A centralized sewage collection and treatment system at Biddeford Pool.
b. Conventional collection system with regional treatment at the Biddeford municipal system, Old Orchard Beach system, new Goose Rocks beach system or new Saco secondary system.
c. Decentralized sewage treatment systems (sand filter - chlorination system for those homes (25) currently discharging untreated domestic waste into the public sewers.

As indicated by the cost-estimates in the plan, regional treatment is more expensive than conventional sewage collection and treatment at Biddeford Pool ($4,800,000 capital cost). This figure represents an approximate cost of $6,800 per dwelling unit while the decentralized system is estimated to cost approximately one-half as much or $3,000 - $3,500 per dwelling unit. The decentralized system would only be required for those homes that have direct discharges, therefore less homes would require service decreasing the overall cost of the project.

The primary water quality problem is caused by the direct untreated sewage discharges from the homes connected to the collection system. All of the alternatives mentioned above would satisfactorily eliminate the untreated discharges and improve water quality. However, the decentralized system, servicing only those 25 homes contributing to the direct discharges, would cost less than $100,000 in capital costs while the centralized systems would cost $4,800,000 or more in capital cost.

It should also be noted that the decentralized treatment system serving only 25 dwelling units will not provide the normal stimulus to residential development associated with conventional sewer service. The provision of a conventional sewer pipe would allow the construction of up to 500 additional dwelling units in the Biddeford Pool area.

Sewage Disposal - Subsurface Systems

A. Technical Considerations

1. Existing and Future Conditions

Except for the central urban area and portions of Biddeford Pool the remainder of Biddeford is not served by a municipal wastewater collection system. To the west, unsewered areas include River, Butzel, Hollis, Drew Mill, Alfred, and Mountain Roads and the western part of South Street. Toward the ocean, there are no municipal sewerage facilities along Proctor, Pool, Fortunes Rocks, Guinea, and Newton Roads, West Street, and all of the coastal area except Biddeford Pool. The Guinea Corner area in the vicinity of the Guinea Road - West Street intersection is quite heavily developed and has reportedly experienced problems with malfunctioning septic tank systems, as have several areas of the city along the coast.

Both Hills Beach and Fletcher Neck, which together form the Pool, are characterized by relatively heavy residential development. Hills Beach has approximately 140 homes on one hundred acres (0.7 homes per acre over half of which are located adjacent to either the Pool or the ocean. Soils are predominantly dune sand and subject to high water table during high tide. As such they are unsuitable for adequate subsurface sewage disposal. Discussions with the local plumbing inspector identified Hills Beach to be an area of septic system malfunction.

2. Alternatives and Recommendations

Subsurface sewage disposal must remain as the major treatment and disposal method for domestic sewage wastes for rural or unsewered areas in the 208 region (cost of public sewers in these areas is prohibitive). Where problems have been defined, sewer service has been evaluated as an alternative to subsurface sewage disposal systems (see Sewage Disposal - Collection and Treatment Systems). Additionally, alternative toilet systems may be used to reduce the potential impact of sewage wastes on soils and groundwater.

In order to minimize future extensions of the wastewater collection system in the future, the Town should consider adopting Appendix 1 of the State Plumbing Code (which provides guidelines for minimum lot sizes where on-site systems are used--this is not a regulation) as part of the zoning ordinance.

B. Management Considerations

1. Existing Conditions

Each town presently regulates subsurface waste disposal in accordance with the State Plumbing Code. Each town has its own Local Plumbing Inspector (usually part-time) who is responsible for issuing permits

and enforcing the Code. Soils analysis is done by State certified soil investigators. They submit soils reports to the Plumbing Inspector and the State Department of Human Services. Maintenance is the individual's responsibility; however, there is no legal requirement for maintenance or inspection of systems after installation.

Malfunctioning sewage disposal systems are declared by law to be a nuisance and must be abated upon order by the municipality.

2. Alternatives and Recommendations

The Maine State Plumbing Code is protective of the environment through proper design and installation of subsurface sewage disposal systems. Alternatives considered to improve the effectiveness of the Code include improved State and local enforcement, mandatory maintenance and inspection, and regionalization of inspection and enforcement programs.

There should be stricter enforcement of the Plumbing Code. This can best be achieved by employment of a full-time, well qualified inspector hired to serve one or more towns. Maintenance should be required by the State and enforced through a local or regional inspection program. A funding program for rehabilitating systems should be investigated, utilizing EPA, Farmers Home Administration, Community Services Administration, and local banks as sources.

C. Impact Assessment

The major issue associated with this waste source is the increased local cost to implement an improved enforcement and inspection program related to the Plumbing Code. This moderate increase in cost will be balanced by improved reliability of subsurface sewage disposal resulting in improved water quality, health, and safety. A regional code enforcement program shared with Arundel would cost an estimated $9,050 per year. This cost for maintenance and enforcement of the Plumbing Code could save potential investments in expensive sewage facilities by assuring the reliability and effectiveness of subsurface disposal.

A secondary impact of this action will affect the homeowners with malfunctioning septic systems. Mandatory rehabilitation is expected to cost the homeowner of a malfunctioning system from $20 for pumping to $2,000 for replacement.

Septage Disposal

A. Technical Considerations

1. Existing and Future Conditions

It is estimated that Biddeford currently has an annual septage generation rate of 544,000 gallons per year. It is anticipated that the future annual septage generation will increase slightly to 550,000 gallons by the year 2000.

Septage, along with solid waste, is presently deposited into the existing city landfill site which is located on Drews Mill Road off Route 111. No records of septage disposal rates are available.

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Soils at the site are mapped as Buxton-Scantic which are deep moderately well and poorly drained soils. Leachate has been observed leaving the south and southeastern portions of the site.

Topographical and geological information indicates that the probable surface and subsurface drainage path is in a southeasterly direction from the site towards Thatcher Brook. The closest residences are on Route 111, approximately one half mile to the south. They are served by private wells. Clay deposits southeast of the site would tend to deter leachate from affecting these wells.

The Biddeford landfill site is not approved by the Department of Environmental Protection for septage disposal. Based on the above considerations it has been determined that the existing septage disposal in Biddeford may have an impact on ground and surface waters in the vicinity. In order to quantify the water quality effects of the disposal site it is recommended that monitoring be performed on surface and subsurface waters in the vicinity of the site. The analysis should include total and fecal coliforms, nitrate, total nitrogen and total conductivity. Sampling should be performed monthly for one year after which the sampling program should be re-evaluated.

2. Alternatives and Recommendations

The current annual septage volume generation potential of 544,000 gallons, considering a nitrogen content of 8 pounds nitrogen per 1000 gallons septage would result in an annual nitrogen rate of 4352 pounds of nitrogen per year. At the loading rate of 100 pounds per acre per year, a site of approximately 43 acres would be required for land application of Biddeford septage. Suitable soils for septage disposal in Biddeford are scarce; one site that may be suitable is just to the west of the existing solid waste disposal area.

Biddeford is currently investigating treating septage at its municipal wastewater treatment plant. The plant employs secondary treatment followed by sludge dewatering and vacuum filtration. A 1974 E. C. Jordan Company, Inc., report, "Report on the Evaluation of Industrial Waste and Operational Problems at the Biddeford Waste Treatment Facility" recommend construction of a 20,000 gallon septage holding tank equipped with a mechanical mixer-agitator, chemical feed apparatus to enable dewatering of the septage on the 2 existing 100 square foot vacuum filters. According to the report, the septage could be dewatered one day per week.

Considering the present efficiency of the secondary treatment process, dewatering the septage directly rather than passing it through the aeration and settling process, is the preferable technique. According to a paper by Cooper and Rezek*, the dewatering of septage on a vacuum filter, either separately or combined with sludge, appears satisfactory.

B. Management Considerations

1. Existing Conditions

The municipality is responsible for providing an approved septage disposal site and operating the site in accordance with State regulations for land disposal of septage. The State regulates the location, application, loading rates, and maintenance of the site to protect the

health of the community, and to prevent drinking water contamination. Alternatively, disposal may be accomplished at a sewage treatment plant. The City has the responsibility to manage the disposal of septage to prevent upsets at the treatment plant and to protect the health and safety of its citizens from the possible hazards of such disposal.

2. Alternatives and Recommendations

The existing management agencies have the requisite authority to properly carry out the task of septage disposal. No management changes are recommended. However, thorough, uniform enforcement of State regulations should be pursued.

C. Impact Assessment

Use of treatment plant facilities as the means for septage disposal is an effective means of processing septage before ultimate disposal on land. The proposal to dewater the septage at the treatment plant will not adversely affect the operation or efficiency of the treatment process. The high capital costs of land required for septage disposal on land (43 acres) tends to favor the processing of septage at the treatment plant. Incineration is the most expensive processing alternative.

Sludge Disposal

A. Technical Considerations

1. Existing and Future Conditions

The Town of Biddeford generates approximately 1500 cubic yards of dewatered sludge per year from its municipal wastewater treatment facility which employs primary and secondary treatment. The sludge is thickened and dewatered with the aid of chemical conditioning and then deposited along with septage at an abandoned borrow pit adjacent to a pond located at the dump site. The site is not approved for sludge disposal by the Maine Department of Environmental Protection.

2. Alternatives and Recommendations

It is recommended that the existing sludge disposal site (including septage) be discontinued and a monitoring program established to quantify the magnitude and extent of the existing water quality impact. A detailed feasibility study to establish a new sludge disposal facility in Biddeford should be initiated.

As previously mentioned for septage disposal, a potentially suitable disposal site is located adjacent to the western border of the existing site. The site is presently partially forested, and has no access road. The site is approximately 300 feet from Swan Pond Brook at its closest point.

*Cooper, I.A., Rexek, J.W., Septage Disposal in Waste Water Treatment Plants, 3rd National Conference on Individual On-Site Wastewater Systems, Ann Arbor, Michigan, November 17, 1976.

Another potential sludge disposal site is located between the Biddeford airport and Richardson Brook. This site is mapped as containing approximately 35 acres of usable Windsor-Deerfield soils. Both of these soil groups are recommended for a sludge nitrogen loading of 100 pounds nitrogen per acre per year. The estimated sludge nitrogen generation rate of 7,580 pounds nitrogen per year would require 75 acres at this loading rate. It is possible that upon inspection the site may be approved for a higher nitrogen loading rate. Also, sludge analysis is necessary to more precisely define the nitrogen content of the sludge. Richardson Brook which drains south is bordered by a cemetery on the opposite bank. The closest residences are located on the road leading to the airport which is just to the south of available area. The area is supplied with public water thus minimizing the threat of private well supply contamination. Potential contamination of Richardson Brook could be minimized through proper site design. The width of the strip of suitable soil is mapped as being up to 1,000 feet wide. Thus the site should allow ample disposal area. An on-site inspection would, of course, be required to determine the actual site suitability and capacity for sludge disposal.

Should the Saco Tanning Corporation complete its sludge incineration plans, sludge from the Biddeford treatment plant might be disposed of at the Saco incinerator.

B. Management Considerations

1. Existing Conditions

The municipality is responsible for providing an approved sludge disposal site and operating the site in accordance with State regulations for land disposal of sludge. The State regulates the location of the site, application, loading rates, and maintenance of the site, to protect the health of the community, and to prevent drinking water contamination.

2. Alternatives and Recommendations

The existing management agencies have the requisite authority to properly carry out the task of sludge disposal. No management changes are recommended. However, thorough, uniform enforcement of State regulations should be pursued.

C. Impact Assessment

The general recommendation stated above is to undertake a detailed feasibility study for locating a new sludge disposal facility. Applicable disposal alternatives have been identified and assessed in general in the Plan. A more detailed impact assessment will be required once the feasibility study develops a specific recommendation. The Impact Assessment Matrix summarizes the alternatives and generally assesses their impact. This can serve as a guide for the municipality in its evaluation of the alternatives.

Solid Waste Disposal

A. Technical Considerations

1. Existing and Future Conditions

Biddeford's solid waste disposal area is located off Route 111 near the

Arundel town line. The site is an abandoned gravel pit, and accepts septage and sludge in addition to solid waste. The site has been used since 1970 and is generally operated as a landfill according to DEP regulations. However, compaction appears to be intermittent.

A steel-wheeled compactor is used for compaction. At an estimated 4.8 pounds per capita per day, approximately 20,000 tons of refuse are generated each year. Compacted to 1000 pounds per cubic yard, 40,000 cubic yards (25 acre-feet) or about 3½ acres of land 7 feet deep are required each year. At this rate, the site has capacity for 4-6 years of operation assuming an additional 7 foot lift over the site. The site is secluded from view, and is greater than 1000 feet from any residence or well.

Soils at the Biddeford site were derived from glacial tills and outwashes. Deep, excessively well drained, coarse grained soils are located to the north and east. Around these soils are found well drained soils with bedrock exposed or within 2 feet of the surface. Some well drained but stony soils are also mapped around the site. In addition to these well drained soils, the site is also surrounded by soils which have a perched or seasonal high water table within 2 feet of the surface. None of the above soils are recommended for use as a landfill. Groundwater is at or near the surface on all sides of the site. The water found to the south of the site appeared to be highly contaminated. The extent to which this contamination migrates from the site is not known. Much of the groundwater apparently eventually surfaces in Thatcher Brook. No complaints of off-site groundwater pollution have been noted. At the present time the city is evaluating an incineration with heat recovery processing method for solid waste in conjunction with Saco and Old Orchard Beach.

Prior to 1970, Biddeford disposed of its solid waste at a site adjacent to the Saco River off Main Street. The area was closed and is presently being used as a park. Any contamination which may migrate from the site enters the Saco River where it is essentially undetectable and does not pose a pollution problem.

A third disposal site in Biddeford is operated by St. Francis College. Refuse from the college is burned and buried in an abandoned gravel pit. No adverse effect on ground or surface waters could be seen.

2. Alternatives and Recommendations

The recommendations to improve solid waste disposal in Biddeford are:

a. Establish a sampling program at the existing sanitary landfill site to define the extent that leachate has migrated. Once this determination has been made and a new disposal process established, the existing site should be closed and covered with impervious material to minimize leachate problems.

b. Continued investigation of the incineration with heat recovery system in cooperation with Old Orchard Beach and Saco.

Refer to the section on Old Orchard Beach, Solid Waste Disposal, for alternatives and recommendations, and management considerations.

TABLE 8

COMPATIBILITY OF INDUSTRIAL WASTES FROM BIDDEFORD INDUSTRIES

Category	Industry	No. of Employees	Treatment (Municipal or On-site)	Comp.	Comp. w/ Pretrt.	Non-Comp.
Chemicals - plastics	Biddeford Industry	150	M		X	
"	Cal Foam Prod's, Inc.	25	M	X		
"	Dirige Plastics	-	M		X	
"	Fiber Materials, Inc.	150	M		X	
"	Shapes Sym. & Sun.	130	M		X	
"	Waterbury Co., Inc.	-	M		X	
Textile	Biddeford Textile Ind.	510	M		X	
"	Station St. Corp.	160	M		X	
"	West Point - Pepperell	300	M		X	
Metals & Machine	Atlantic Prec. Prod., Inc.	25	M	X		
"	Avanti Machine Shop	-	M		X	
"	K.T. Valve Co.	-	M		X	
"	Maine Metal Shop	-	M		X	
"	Roncoy Machine Tool Co.	-	M		X	
"	Haley Metal Shop	20	OS			
"	Metal Tech., Inc.	65	OS			
"	Precision Screw Mach.	45	OS			
"	Prescott Metal Shop	18	OS			
Laundry	Landry Laundry & Linen	-	M	X		
"	Westinghouse Dry Clnr. & Laund.	-	OS			
Dairy	Landry Dairy, Inc.	10	OS			
Printing	Acme Press	-	M	X		
"	Journal Pub. Co.	53	M	X		
Leather	Midland Shoe Prod. Corp.	-	OS			
"	Quality Leather Co.	50	M		X	

Comp. - Compatible
Pretrt.- Pretreatment
OS - On-Site
M - Municipal

Industrial Waste Disposal

A. Technical Considerations

1. Existing and Future Conditions

The Biddeford municipal waste facility, an activated sludge plant without primary sedimentation, is not now in compliance with its NPDES permit limitation for BOD, SS and fecal coliform. But the plant's average daily flow (2.3 MGD) is less than the design flow of 2.64 MGD. Shock loads from industry and high flows during storms from areas with combined sewers, however, have produced flow rates in excess of 5 MGD. An important step toward improving the existing plant's efficiency would be the equalization and reduction of some of the industrial waste loadings at the treatment plant. And industry has already reduced its flow discharged to the collection system by obtaining a NPDES permit for direct discharge of uncontaminated cooling water. In addition, the installation of pretreatment facilities, especially equalization and neutralization should also be considered.

The following table, based on information available, makes preliminary decisions on the compatibility of wastes from various industries in Biddeford with the facilities at the municipal treatment plant. For industries using on-site disposal, it was assumed that treatment is provided by septic tanks with subsurface disposal of the effluent. Sanitary waste from industrial sources is compatible with treatment at the municipal facility. It has been assumed (in the following table) that the industries listed employ some wet processes in their activities. If, however, the processes are dry only, as in metal fabrication, the degree of compatibility could be different. Site visits, by a city official, to major industries should be conducted if there is a question regarding the need for pretreatment.

The Biddeford-Saco Water Company discharges wastes to the Saco River. There are two sources of waste from water treatment plants: the waste from coagulation-sedimentation basins which, depending on the quality of the source water, are emptied only a few times each year, and the waste from filtration units, which are backwashed when the head loss is around eight feet (or about every 72 hours). As of December, 1975, the water company had completed construction of a lagoon for treating these two wastes in order to meet the following permit requirements.

	Daily Average	Daily Maximum
Total suspended solids:	30 mg/l	60/mg/l
Total settleable solids:	0.1 mg/l	--

The discharge of an effluent within these limits should not cause a violation of the water quality standards of the Saco River which has been given a B-2 classification in this area. Based on a 7-day 10-year minimum flow of 500 cfs, and a daily wash water discharge of 5% of treated water, the Biddeford-Saco water treatment plant's daily discharge would raise the minimum figure of 0.4 mg/l of suspended solids in the Saco River by only 0.01 mg/l. Many water companies have achieved zero discharge and conserved water by recycling to the influent of the water plant. This also eliminates the need for an

NPDES permit. Sludge disposal must be in approved areas.

The West Point-Pepperell textile industry discharges only uncontaminated wastewater to the Saco River. Their permit allows a daily average discharge of 110,000 gallons, or a daily maximum of 150,000 gallons, of cooling water with a temperature of 84 degrees F. Waste discharges from all other operations are sent to the Biddeford municipal treatment plant. Clean cooling water should not contravene any of the Maine stream classifications which, incidentally, do not include temperature criteria. Discharge of warm water during cool periods can enhance food production for fish; a sudden cessation of warm water, however, has resulted in disturbances to aquatic life.

The Cole Farm Dairy's permit for its wastewater has been withdrawn because of the industry's elimination of its discharge. This has been accomplished by using a pond to storm the waste and then applying the stored water to fields for irrigation crops. Care should be taken that the pond does not overflow to a stream, become septic, contaminate ground water, or that spraying does not clog the soil and permit the waste to be discharged to a stream.

2. Alternatives and Recommendations

Aside from the problems of "slug" loads and the need for neutralization of wastes from a few industries in the city, the primary concern with existing and future industries is the amount of "toxic" waste discharged to the municipal collection system and the total flow and accompanying waste load. It would appear that as a first step, city officials should require those industries which have wastewater which may require pretreatment to make a site visit to the industries, examine water usage records and, if necessary, require the industries to perform analysis of their wastewater.

Also, in view of the potential need for expansion of treatment capacity city officials should ask industries to consider "housekeeping" projects that will reduce the total amount of industrial wastewater discharged to the municipal system. Minor process changes, reuse of wastewater, elimination of non-contact cooling water, and repair or alteration of water using fixtures are some of the ways to reduce flow. Another is to increase to all users the cost of providing water and/or treating the water discharged to the municipal system. These are some of the options available--it is up to the city officials to decide which one or combination of options is in the best interest of the community.

B. Management Considerations

1. Existing Conditions

Controls are administered by the municipality. Direct discharges into receiving water bodies are regulated through the NPDES permit system.

2. Alternatives and Recommendations

Administration of controls on industrial waste discharge to municipal

and sewerage systems should remain with the existing management agencies. Enforcement of pretreatment standards and other requirements should be improved by establishing adequate sewer use ordinances and industrial waste survey programs as described in the Plan.

C. Impact Assessment

What is called for is more active involvement or interaction between city officials and local industries to determine more accurately the waste flows to the municipal plant and the effect those waters have on plant operation. While improving the operation and efficiency of the municipal plant, involvement of the City in such a program will tend to increase administrative costs. Additionally, pre-treatment requirements, equalization of flows, minor process changes, or water conservation measures will tend to increase costs to local industries. These increased costs will be balanced by improved treatment of wastewater flows (hence a water quality benefit), and increased capacity of the treatment plant.

Runoff from Development

A. Technical Considerations

1. Existing and Future Conditions

The bulk of urban Biddeford's stormwater runoff is collected, conveyed and discharged through a system of separated storm sewers and combined sewers. Runoff conveyed by the separated storm sewer system is discharged at 10 points identified in the Plan. An additional 300 acres of the southwestern Biddeford is drained by the relatively new "southwest" storm sewer system. However, this system also carries some sanitary flow and thus cannot be identified as a separate storm sewer.

Sanitary sewage has also been noted at other stormwater discharge points, notably Plymouth Drive. Cross-connections of sanitary sewers to storm sewers are suspected in several areas including the 5 Points Area and Bowdoin Avenue. In at least one other case, (at the intersection of Dartmouth and May Streets) the overflow of a combined sewer is believed to discharge into storm sewers.

Biddeford's separated storm sewer system is, in general, newer and better designed than the City's combined sewer system. The most significant problems, as noted in the E. C. Jordan study, were sanitary sewer connections into the separated storm system. No significant sewerage operational problems were noted, however, nor were there any significant drainage problems (per conversations with the City's engineer).

The combined sewer system has insufficient capacity to convey all flows during storm events. For this reason, numerous relief, bypass, or overflow points have been developed which allow untreated combined sewer flows to be discharged to natural watercourses or drainage channels.

A few of the identified overflow points are located at pumping stations where overflows occur only during an overloading or mechanical failure of these stations. There are also a few other points where overflow occurs only infrequently. The majority of the overflows, however, are

of a static nature (i.e., without flow controls) and, permit discharge during frequent (i.e., weekly) storm events. All of such overflow release points are in manholes or pump stations where overflows occur when downstream sewer capacity is exceeded or, as often happens, when the dry-weather outlet is clogged.

Apparently, some of these overflow points would discharge a lesser amount if sewers below the outfalls were given more frequent maintenance. (Some overflow points discharge even during dry weather periods and are, in essence, outfalls.) Improved maintenance of the existing system would help to minimize dry weather discharge. However, such maintenance would be of dubious value in controlling storm overflows given the limited downstream capacity of both the combined sewer system and the present sewage treatment plant. That is to say, better maintenance might reduce the magnitude of pollutant loadings slightly (by conveying a greater portion of the "first flush" of runoff to the treatment facility), but the total volume of untreated combined sewage discharge would probably not change significantly.

The sewer survey in 1974 by the City's consultant also defined other operational problems with the present combined sewer system. Deposition and accumulation of wastes and sediment apparently occur in many of the combined sewers. This deposition can be attributed to the deterioration of the sewers and to the fact that many sewers were laid at too flat a slope to obtain certain minimum velocities in order to prevent deposition.

The estimated volume of runoff from a frequent (weekly) storm event discharged to the Saco River by separated storm sewers, plus the uncollected overland runoff from the urban area together with the contaminant loadings are given below:

STORMWATER RUNOFF - FLOWS AND LOADS PER WEEKLY STORM EVENT

Drainage Area (Acres)	Discharge (Million Gal.)	BOD_5 (lbs)	SS (lbs)	N (lbs)	P (lbs)	Fecal Coliform (MPN)
510	1.8	460	9,700	46	15	2.8×10^{12}

The estimated volume of runoff from a weekly storm event collected by combined sewers and then discharged via overflows, together with the contaminant loadings are:

COMBINED SEWER OVERFLOWS PER WEEKLY STORM EVENT
(Discharge to Saco River)

Drainage Area (Acres)	Discharge (Million Gal.)	BOD_5 (lbs)	SS (lbs)	N (lbs)	P (lbs)	Fecal Coliform (MPN)
1,030	4.2	3,900	15,000	380	140	3.2×10^{14}

Note: The present weekly BOD load from combined sewer overflows and stormwater runoff is slightly more than the weekly BOD load from the treatment facility.

Rainfall, giving rise to stormwater flows, is primarily overland runoff in the Pool Area.

The developed areas of the Pool have been divided into three areas: Hills Beach, Biddeford Pool (proper) and Fletcher Neck. For each area the "rational method" (see "Assessment Methodology" in the Plan has been applied in order to estimate the volume of runoff from a typical storm event of the intensity and duration that occurs, on the average, once a week.

STORMWATER RUNOFF PER WEEKLY STORM EVENT

Developed Area	Drainage Acreage	Volume Per Storm	Receiving Waters
Hills Beach	146.9 acres	0.6	Wood Island Harbor
Fletcher Neck	96.4 acres	0.4 MG	Atlantic Ocean
Biddeford Pool Peninsula	134.0 acres	0.6 MG	Wood Island Harbor and Atlantic Ocean

The concentrations of pollutants which are currently being contributed to the receiving waters--on a weekly basis--as a result of stormwater runoff are shown in the following table. These loadings are derived from the "generalized parameters" of stormwater discussed in the "Assessment Methodology" section of the Plan.

STORMWATER LOADS FROM A WEEKLY STORM EVENT

Receiving Waters	BOD (lbs)	SS (lbs)	Total N (lbs)	Total P (lbs)	Fecal Coliform (MPD)
Wood Island Harbor	230	4,900	23	8	1.40×10^{10}
Atlantic Ocean	180	3,700	18	6	1.07×10^{12}

2. Alternatives and Recommendations

The adoption of the principles given in the stormwater management alternative in the Point Source Plan should be considered by the City of Biddeford. No outstanding storm runoff related problems were noted during discussions with the City Engineer. Much of the combined sewer separation work as detailed by the City's Consultant, would provide new storm sewers. This work, plus recently accomplished work such as the South Side Storm Drain System, should provide for Biddeford's urban stormwater drainage needs over the foreseeable future.

Some priority should be given to improvement projects such as locating and separating sanitary sewers and service connections from otherwise separate storm sewers.

Estimated urban stormwater discharges and associated contaminant loadings for a weekly storm event, projected through the year 2000, are given in the following table.

URBAN STORMWATER RUNOFF, PER WEEKLY STORM EVENT*

Year	Discharge MG/Event	BOD_5 (lb/Event)	SS (lb/Event)	Fecal Coli. (MPN/Event)	Nitrogen (lb/Event)	Phosphorous (lb/Event)
1975	1.8	460	9,700	2.8×10^{12}	46	15
1980	4.2	1,100	22,000	6.3×10^{12}	100	34
1985-2000	6.5	1,700	34,000	9.7×10^{12}	160	53

*Assuming separation plan is implemented and is half complete by 1980 and completed by 1985.

Urban stormwater runoff from the Biddeford Pool area should not change significantly from the existing discharge.

The 1974 comprehensive sewer study by the City's Consultant reviewed system separation and interception, storage and treatment of combined sewer overflows as options for the elimination of combined sewer overflows. Total costs for storm runoff separation were projected to be $3.8 million dollars (ENR approx 2100).

Cost for interception, storage and treatment of combined sewer overflows were projected to total $12.7 million dollars (ENR approx 2100).

The interception storage and treatment alternative, as conceived by the City's Consultant, included two major interceptors one paralleling and possibly within the Saco River and another paralleling West Brook. These interceptors would lead to a new storage and treatment facility to be located near the confluence of West Brook and the Saco River.

Costs for the two interceptors were estimated to total $3.3 million (ENR approx 2100). Thus storage and treatment facilities would have to cost less than $.5 million to make the interception, storage and treatment cost effective.

Capital costs for storage and treatment facilities for overflows are closely related to specific area needs and resources and are thus quite difficult to estimate on a preliminary basis. Lager & Smith* reviewed the costs of existing storage and treatment facilities. Based upon figures provided in this review we believe that no existing storage and treatment technology could be built for less than the $.5 million figure noted above.

Thus the interception, storage and treatment of storm overflows does not appear to be cost effective for the City of Biddeford and the alternative program of sewer separation should be undertaken.

Sewer separation priorities are usually established based upon maximizing gallonage of overflows prevented per dollar invested. Biddeford's separation scheme should also stress limiting the discharge of fecal coliform. Our assessment of overflow loadings versus separation costs indicates that these goals are compatible.

*Lager & Smith, op. cit.

Based on available data it apparently would be most effective to give highest priority to separating areas within the areas A, B, C, D, E* as delineated by the City's Consultant. Separation in Areas F and I should follow. Separation can then be completed with the separation of Areas G and H.

High priority should also be given to improving maintenance or modifying overflow points to eliminate dry weather discharges and facilitate the collection of the "First Flush" or combined runoff.

Completion of other less urgent remedial work, as outlined in the 1974 Sewer Survey, should also proceed.

Estimated combined sewer overflow discharges to the Saco River and associated contaminant loadings for a weekly storm event, projected through the year 2000, are given in the following table.

COMBINED SEWER OVERFLOW DISCHARGE, PER WEEKLY STORM EVENT[1]

Year	Discharge (MG/Event)	BOD_5 (lb/Event)	SS (lb/Event)	Fecal Coli. (MPN/Event)	Nitrogen (lb/Event)	Phosphorous (lb/Event)
1975	4.2	3,900	15,000	3.2×10^{14}	380	40
1980	2.1	2,000	7,500	1.6×10^{14}	190	70
1985-2000	No Discharge					

[1]Assumes separation plan is implemented, is half complete by 1980 and completed by 1985.

B. Management Considerations

1. Existing Conditions

The primary responsibility for controlling storm water runoff rests with the municipality.

2. Alternatives and Recommendations

Runoff from development can be limited by local codes and ordinances such as subdivision regulations and zoning ordinance performance standards. Additionally, the State Site Location Law requires erosion and sediment control plans for new development. The existing management agencies have adequate authority to control runoff. The Town has the authority to regulate the use of land to limit runoff and the local treatment authority has the power to control collected runoff. Therefore, no institutional changes are recommended. However, to improve controls to limit runoff municipalities are urged to review, modify and adopt the model subdivision regulations and zoning ordinance performance standards included in the Plan.

*See Appendix H for more details of the proposed separation plan; source: Comprehensive Sewer Study, City of Biddeford, Maine by E. C. Jordan, December 1974.

A technical review team should be funded through federal, state, and local sources, to assist the municipality in establishing ordinances and in the review of proposed developments.

C. Impact Assessment

Several of the technical recommendations relate to controlling stormwater runoff and drainage through utilization of the natural capability of soil adjacent to development. This may be achieved through the recommended ordinances, of which the essential purpose is to minimize the increase of runoff from developed lands, attempting to maintain to the extent possible the natural runoff conditions. This action will tend to eliminate storm related discharges to surface waters and reduce the potential for flooding. Controlling stormwater runoff at the source will decrease the demand for expensive collection and transport facilities.

A secondary impact of the implementation of the ordinances will be increased land development costs.

The other technical recommendations relate to controlling and minimizing combined sewer overflows to the Saco River. Minimizing combined sewer overflows will reduce the impacts on water quality from the combined raw wastewater and stormwater discharge. Bacteria, BOD, and suspended solids will be proportionately reduced according to the efficiency of controls applied.

Runoff from Agriculture

A. Technical Considerations

1. Existing and Future Conditions

The land use/land cover map indicates there are about 30,000 acres in agricultural use in the 208 area (12.9% of the land area). Only 10,000 acres are under intensive farming as cropland, the rest being open pasture or hay fields. The Soil Conservation Service has estimated that 66% of the farms are operated under the guidance of Conservation Plans designed to limit soil loss from the land. Because of this, the erosion and sedimentation problems associated with agricultural land use and the potential water quality impact of runoff from these lands is considered minor for this region.

2. Alternatives and Recommendations

Structural controls to minimize agricultural runoff must be applied on a site specific basis. The Soil Conservation Service's recommended agricultural practices and controls for soil loss developed through Conservation Plans are sufficient to protect water quality in this region. Nonstructural control recommendations are in the Land Use Chapter of the Plan as locally enforced Performance Standards (see Management Considerations below).

B. Management Considerations

1. Existing Conditions

Municipalities have the authority to manage land use controls. The Saco River Corridor Commission manages the land within 1000 feet of the Saco

River. Voluntary USDA programs are administered by S.C.S. and A.S.C.S. The federal programs offer technical and financial assistance to farmers to control soil loss.

2. Alternatives and Recommendations

Funding of USDA programs should be continued. Additional money should be channeled into the A.S.C.S. Program and the $2,500 cut-off per project should be raised.

Municipalities should review, revise and adopt appropriate versions of the Model Performance Standards for control of run-off and soil loss. A technical review team should be funded by federal, state, and local sources to assist the municipality in the establishing of ordinances and in the review of proposed developments.

C. Impact Assessment

The essential purpose of the recommended ordinances is to minimize the increase of runoff from agricultural lands attempting to maintain to the extent possible the natural runoff conditions. This action will tend to eliminate storm related discharges to surface waters and reduce the potential for flooding.

A secondary impact of the implementation of these ordinances will be increased costs of agricultural land use.

Salt Storage and Application

A. Technical Considerations

1. Existing and Future Conditions

Salt (sodium chloride) is used in Southern Maine to achieve bare pavement conditions during the winter months. Salt will continue to be used as long as the bare pavement policy is mandated and other highway de-icing chemicals are not used because of their prohibitive cost. Surface water quality problems have not been associated with highway de-icing salt uses. However, a small number of individual water supplies have been found to exceed chloride standards.

2. Alternatives and Recommendations

Since use of highway de-icing salt compounds will continue, general guidelines have been presented for the storage, handling and application of these compounds. These guidelines are sensitive to the conflicting policies of bare pavements in winter and clean water and attempt to strike a balance between the two.

B. Management Considerations

1. Existing Conditions

The State and municipalities have the authority and responsibility to maintain roads and highways in the region. The State has established guidelines and procedures for highway de-icing salt storage and application, and has developed educational and training programs for local operators.

2. Alternatives and Recommendations

Existing Maine laws should be investigated for enforcement powers related to regulate the use of highway de-icing compounds. In the absence of enforceable regulations and state level standards adequate to protection of the environment and compatible with policies related to winter driving conditions, MDEP, MDOT and the other agencies should collaborate on their development. This program development should include a series of checks and balances through required reporting, surveillance and/or sampling, and analysis.

C. Impact Assessment

Continued use of highway de-icing salt for road maintenance in the winter months will present a potential threat to surface and groundwater quality. Following recommended practices for storage and application of the salt will minimize the potential for water quality degradation while maintaining bare pavement policy. These practices may tend to increase the costs of providing facilities for salt storage; however, costs may be partially offset by the resulting conservation of salt.

Runoff from Construction Activities

A. Technical Considerations

1. Existing and Future Conditions

Because of the need to remove the cover vegetation and leave areas exposed during many construction projects, the potential for erosion and sedimentation is great. The soil loss can be extensive and can result in significant degradation of surface water through sedimentation and siltation. Since population projections indicate continued growth and development, construction activities will remain a potential source of water pollution.

2. Alternatives and Recommendations

Since erosion and sedimentation in the study area is principally site specific, each situation or occurrence must be considered in relationship to its own setting. The two major factors to be considered in erosion and sediment control are:

a. Reduction of the raindrop impact energy which reduces its dispersing and eroding power below the critical force and

b. Reduction of the velocity of the surface runoff which, in turn, lessens its abrading power and transporting capacity.

Probably the most effective method of reducing the impact energy of raindrops are those procedures which cover the soil; e.g., natural plant cover, mulching, temporary cover crops and paving or covering with non-erodable materials. If the precipitation falling on the site is not allowed to pick up velocity as it runs off then its erosive power is curtailed. Shortening the length of slope is one of the most effective methods of controlling runoff velocities. This shortening can be accomplished by various techniques such as structural measures, cropping or management patterns, or tillage practices.

It is recommended that the most cost-effective manner of instituting methods for controlling runoff from construction activities is through local land use regulatory controls.

B. Management Considerations

1. Existing Conditions

Construction controls are implemented at all levels. The Federal government imposes controls through the Federal Highway Administration, and the Corps' activities. The State imposes controls through the Site Location Law, the Great Ponds Law, the Wetlands Act, Stream Bulldozing, and Mandatory Shoreland Zoning. The Saco River Corridor Commission imposes controls on construction activities. Local controls are imposed through subdivision and zoning regulation.

2. Alternatives and Recommendations

Since the requisite legal authority to regulate construction activities exists, no institutional change is recommended. Municipalities should review, revise, and adopt appropriate versions of the Model Performance Standards for control of runoff and soil loss.

A technical review team should be funded by Federal, State, and local sources to assist the municipality in the establishment of ordinances and in the review of proposed developments.

C. Impact Assessment

The essential purpose of the recommended ordinances is to minimize the increase of runoff from agricultural lands, attempting to maintain to the extent possible the natural runoff conditions. This action will tend to eliminate storm related discharges to surface waters that may adversely affect water quality.

A secondary impact of the implementation of these ordinances could be increased costs for agricultural activities.

Petroleum Storage and Transfer

A. Technical Considerations

1. Existing and Future Conditions

From the evidence there is no question that petroleum products have the potential to contaminate water resources in the SMRPC 208 area. Furthermore, with the potential for more than 31 million gallons of #2 home heating fuel transferred in over 150,000 transactions and with over 16 million gallons of storage capacity within the 208 area, substantial opportunity for similar oil pollution will continue to exist for the foreseeable future. Assuming little change in present technological and other controls, spills and leaks will likely culminate in local long-term environmental degradation with little or no opportunity for corrective action.

Boating activity (specifically exhaust emissions) may not cause major adverse effects on lakes; however, support facilities (e.g., marinas selling oil and fuel and doing repair work), accidents, and negligence in the handling of petroleum products may degrade water quality.

2. Alternatives and Recommendations

This planning effort did not address the large amount of technical control methods for the handling and distribution of petroleum products.

B. Management

1. Existing Conditions

Petroleum storage and transfer are currently managed by Federal, State and local governments. The Federal and State governments primarily regulate water transport, large on-land storage facilities, and discharge to groundwaters and surface waters. Local governments have the authority to control the siting of oil storage facilities adjacent to water bodies.

2. Alternatives and Recommendations

A State level program designed to identify the magnitude of petroleum related pollution should be developed. Applicable controls should be recommended and incorporated into legislative and regulatory programs. Local and regional input should be sought by the State in the design and implementation of the program.

C. Impact Assessment

As long as substantial volumes of petroleum products are handled, stored, transferred and consumed in the SMRPC 208 area, contamination of water resources is likely to continue. Assuming little change in present technological and management controls, spills and leaks will likely culminate in local long-term environmental degradation with little or no opportunity for corrective action. However, a state level program designed to improve the handling of petroleum products will minimize the potential for petroleum related pollution in Maine.

SOUTHERN MAINE REGIONAL PLANNING COMMISSION
AREAWIDE WASTE TREATMENT MANAGEMENT PLAN

IMPACT ASSESSMENT MATRIX BIDDEFORD

LEGEND
- ■ VERY NEGATIVE
- □ NEGATIVE
- ▭ NO IMPACT
- ■ POSITIVE
- ■ VERY POSITIVE

FACTORS IMPACTED

			NATURAL FACTORS																							CULTURAL FACTORS														COST COMPARISON	
			LAND		SURFACE WATERS									GROUNDWATER						AIR				FLORA			FAUNA				LAND USE					Recreation		SOCIAL					ECONOMIC					
		TECHNICAL & MANAGEMENT ALTERNATIVES	SOIL	UNIQUE PHYSICAL FEATURES	DISSOLVED OXYGEN	BIOLOGICAL OXYGEN DEMAND	SUSPENDED SOLIDS	NUTRIENTS	DRINKING WATER SUPPLY	TEMPERATURE	TURBIDITY	BACTERIA & VIRUSES	Toxic Substances & Heavy Metals	CHLORIDES	NITRATES	PHOSPHATES	HEAVY METALS	BATERIA & VIRUSES	DRINKING WATER SUPPLY	PARTICULATES	NITROGEN OXIDES	SULFUR OXIDES	TOXIC SUBSTANCES	NATURAL VEGETATION	MANAGED VEGETATION	AQUATIC VEGETATION	BIRDS	LAND ANIMALS	FISH & SHELLFISH	FOOD CHAINS	Open Space, Wetlands, Forest	AGRICULTURAL	RESIDENTIAL	COMMERCIAL	INDUSTRIAL	FISHING	WATER RECREATION	POPULATION GROWTH	DEVELOPMENT PATTERN	EMPLOYMENT	HEALTH & SAFETY	INSTITUTIONS	WATER SUPPLY	RECREATION	FISHING	MANUFACTURING	CAPITAL COST	Operation/Maintenance Cost
WASTE SOURCES	SEWAGE DISPOSAL COLLECTION & TREATMENT SYSTEMS	Treatment Alternatives																																															
		NO ACTION (CONTINUE DIRECT DISCHARGES)																																															
		CENTRALIZED TREATMENT-BIDDEFORD POOL			■	■	■	■			■	■																				■	■					■	■								■	■
		DECENTRALIZED TREATMENT-BIDDEFORD POOL			■	■	■	■			■	■																■	■			■	■					■	■								■	■
		Regional Alternatives																																																
		BIDDEFORD POOL TO BIDDEFORD CITY FACILITY			■	■	■	■			■	■																■	■			■	■					■	■								■	■
		BIDDEFORD POOL TO OLD ORCHARD BEACH FACILITY			■	■	■	■			■	■																■	■			■	■				□	□	■	■					□	□	■	■
		BIDDEFORD POOL TO NEW GOOSE ROCKS BEACH STP			■	■	■	■			■	■																■	■			■	■					■	■								■	■
		BIDDEFORD POOL TO SACO NEW STP			■	■	■	■			■	■																■	■			■	■					■	■								■	■
		Sewer Extensions																																																
		Management Alternatives																																																
		USE EXISTING AUTHORITY																																																
		DEVELOP NEW AUTHORITY																																																
	SEWAGE DISPOSAL SUBSURFACE SYSTEMS	Treatment Disposal Systems																																																
		SUBSURFACE WASTE DISPOSAL																																																
		ALTERNATIVE TOILETS													■		■							□														■											
		SEWER EXTENSIONS													■		■							□														■											
		Management Alternatives																																																
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		STRICT CODE ENFORCEMENT													■		■															□					□												
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		REGIONAL CODE MANAGEMENT																																																
	SEPTAGE DISPOSAL	Disposal Methods																																																
		NO ACTION	■												■		■																																	
		TREATMENT PLANT			■	■	■	■			■	■																																						
		LAND APPLICATION																										□	□			■	■																	
		INCINERATION	■		■	■	■	■			■	■																																						
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		USE EXISTING AUTHORITY																																																
		REGIONALIZATION																																																
	SLUDGE DISPOSAL	Disposal Methods																																																
		NO ACTION	■												■		■																																	
		LAND APPLICATION																																																
		INCINERATION	■												■		■																																	
		COMPOSTING	■																					□																										
		Management Alternatives																																																
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		REGIONALIZATION																																																
	SOLID WASTE DISPOSAL	Disposal Methods																																																
		NO ACTION	■		■	■	■	■			■	■			■	■	■	■														■																	
		SOURCE SEPARATION			■	■	■	■			■	■			■	■	■	■																						■								■	■
		BAILING OR SHREDDING													■	■	■	■														■																	
		INCINERATION	■		■	■	■	■			■	■			■	■	■	■														■																■	■
		INCINERATION WITH HEAT RECOVERY	■		■	■	■	■			■	■			■	■	■	■														■																■	■
		SANITARY LANDFILL																														■																	
		Management Alternatives																																																
		USE EXISTING AUTHORITY																																																
		REGIONALIZATION																																																

ARUNDEL

WASTE SOURCES ADDRESSED	PRIORITY*
SOLID WASTE DISPOSAL	⊕
RUNOFF FROM AGRICULTURE	⊕
SALT STORAGE AND APPLICATION	⊕
RUNOFF FROM CONSTRUCTION ACTIVITIES	⊕
PETROLEUM STORAGE AND TRANSFER	⊕

Solid Waste Disposal

A. Technical Considerations

1. Existing and Future Conditions

The solid waste disposal site for the Town of Arundel is located on private property off the Mountain Road approximately one mile from the Town Hall. The site is leased but is operated by the town as a dump. No sign of burning was evident. The site has been operated for three years, and two years remain in the contract the town has with the owner. With a per capita generation of three pounds per day, approximately 1040 tons of refuse are produced each year. Compacted to 750 pounds per cubic yard, the 2½ acre site has sufficient capacity for an additional four years of operation. The site is centrally located, well secluded from view, and is greater than 1000 feet from any residence or well.

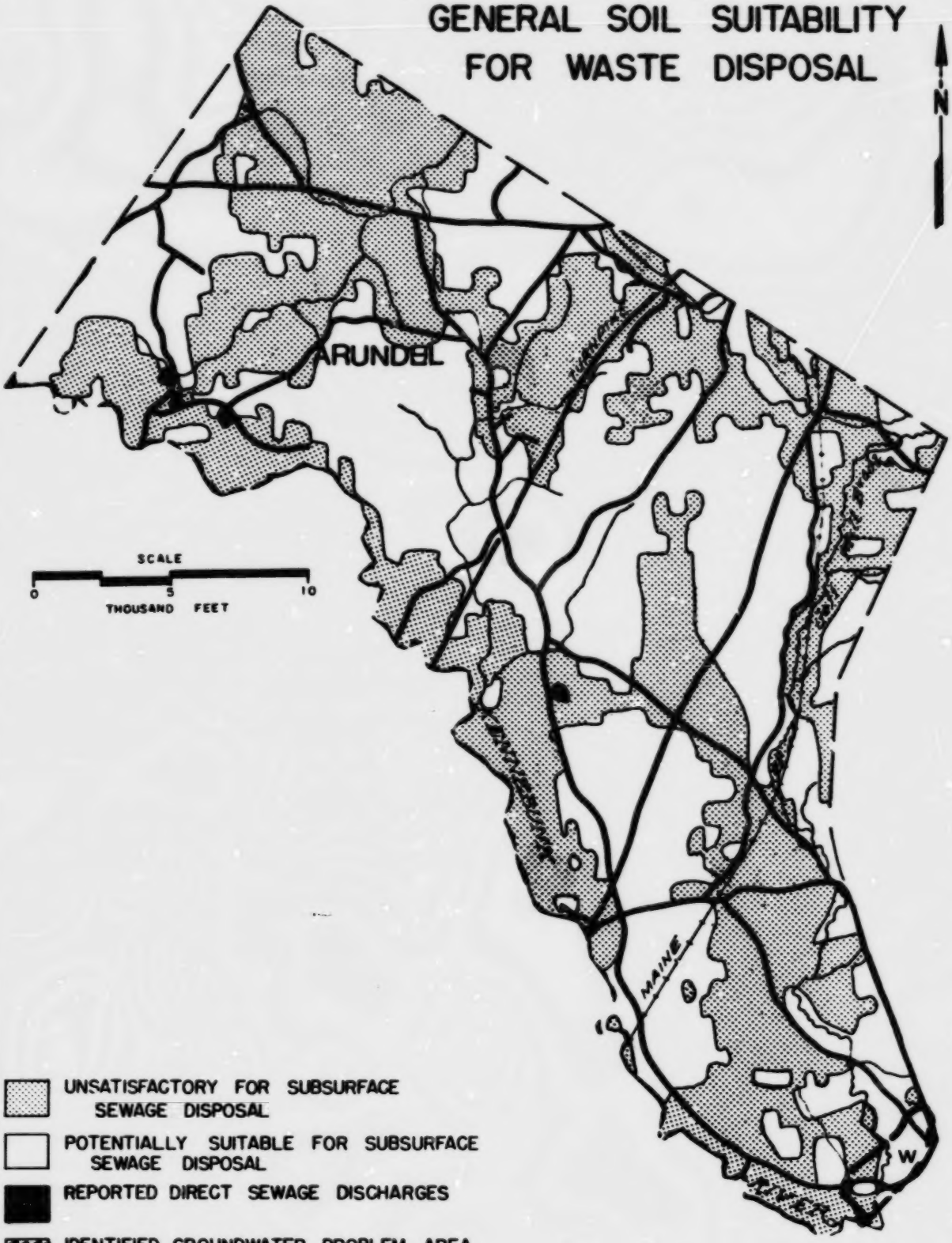
Soils surrounding the site are generally sandy and are classified as Agawam-Ninigret. These soils are well drained sands. No groundwater was visible in the base of the trench and refuse is probably being placed above the groundwater table. Because of the perviousness of the soil and cover material, any leachate which is generated apparently finds its way to the groundwater table. The effect is probably not significant, however, due to the small volume of refuse, and no evidence of off-site water contamination was apparent.

The previous disposal area for the Town of Arundel is located on the Whitten Hills Road in Kennebunkport. The site is an abandoned gravel pit. No problems with groundwater pollution from this site are known.

2. Alternatives and Recommendations

A new disposal facility will be required within the planning period. The alternatives discussed in the Plan include: sanitary landfill, baling and shredding, incineration, and incineration with heat recovery. Regional disposal systems have also been evaluated for Kennebunk, Arundel, Kennebunkport, and Wells. Costs have been compared on an individual town basis and with the towns together as a region.

*⊕ LOW PRIORITY



UNSATISFACTORY FOR SUBSURFACE SEWAGE DISPOSAL

POTENTIALLY SUITABLE FOR SUBSURFACE SEWAGE DISPOSAL

REPORTED DIRECT SEWAGE DISCHARGES

IDENTIFIED GROUNDWATER PROBLEM AREA

W AREAS SERVED BY PUBLIC WATER

S AREAS SERVED BY PUBLIC SEWERS

FIGURE 10

Estimated Annual Solid Waste Disposal Costs - Alternatives

	Annual Generation	Sanitary Landfill	Baling or Shredding	Incineration	Incineration Heat Recovery
The Region	18,300	$109,800 $6/T	$164,700 $9/T	$292,800 $16/T	$160,125 $8.75/T

Annual generation of solid waste in the Wells-Kennebunk-Kennebunkport-Arundel region is 18,300 tons. Landfill is probably the only acceptable disposal option viable in the region. A regional landfill would cost $6 per ton.

The number of suitable landfill sites in the region is not great, and most of these sites would require a great amount of modification to be environmentally acceptable. This becomes cost effective only with large disposal volumes. The estimated costs of operating individual and regional landfills is shown below. Although regional landfill is the most cost effective disposal method available for the towns within the region, transportation costs for most of the towns will increase. This added cost will not be great, however, and will not necessitate the use of transfer stations for transport within the region.

Estimated Annual Solid Waste Disposal Costs - Individual Versus Regional

Municipality	Annual Generation	Sanitary Landfill
Arundel	1,900	$13/T
Kennebunk	7,000	$8.50/T
Kennebunkport	2,800	$11/T
Wells	6,600	$9/T
Region	18,300	$6/T

B. Management Considerations

1. Existing Conditions

The municipality of Arundel leases and operates a solid waste disposal site.

2. Alternatives and Recommendations

Arundel has the option of continuing to lease and operate their disposal facility or joining a regional disposal system. A regional disposal district may be established by a special district or interlocal agreement. The cost estimates for waste disposal support selection of the regional system.

C. Impact Assessment

Although cost estimates indicate that a regional landfill is the most cost-effective method for solid waste disposal in Arundel, further study of the political and technical opportunity will be required prior to the development of a firm recommended course of action.

In general, the alternative processing and disposal methods investigated in the plan primarily impact air and water quality. Sanitary landfills, regardless of the solid waste processing method selected, can impact water quality (groundwater and surface water) through generation of leachate. Incineration as a processing method reduces water quality impact while generating potential air quality impacts. Incineration with heat recovery has the same environmental impacts as standard incineration but reduces the economic impact (high cost of incineration) through revenues from sale of steam. Baling and shredding do not reduce water quality impact from leachate, but rather may provide economic benefit through increased landfill life. Source separation provides benefits through reduction of waste that must be disposed. These impacts are summarized in the Impact Assessment Matrix.

Runoff from Agriculture

A. Technical Considerations

1. Existing and Future Conditions

The land use/land cover map indicates there are about 30,000 acres in agricultural use in the 208 area (12.9% of the land area). Only 10,000 acres are under intensive farming as cropland, the rest being open pasture or hay fields. The Soil Conservation Service has estimated that 66% of the farms are operated under the guidance of Conservation Plans designed to limit soil loss from the land. Because of this, the erosion and sedimentation problems associated with agricultural land use and the potential water quality impact of runoff from these lands is considered minor for this region.

2. Alternatives and Recommendations

Structural controls to minimize agricultural runoff must be applied on a site specific basis. The Soil Conservation Service's recommended agricultural practices and controls for soil loss developed through Conservation Plans are sufficient to protect water quality in this region. Nonstructural control recommendations are in the Land Use Chapter of the Plan as locally enforced Performance Standards (see Management Considerations below).

B. Management Considerations

1. Existing Conditions

Municipalities have the authority to manage land use controls. The Saco River Corridor Commission manages the land within 1000 feet of the Saco River. Voluntary USDA programs are administered by S.C.S. and A.S.C.S. The federal programs offer technical and financial assistance to farmers to control soil loss.

2. Alternatives and Recommendations

Funding of USDA programs should be continued. Additional money should

be channeled into the A.S.C.S. Program and the $2500 cut-off per project should be raised.

Municipalities should review, revise and adopt appropriate versions of the Model Performance Standards for control of run-off and soil loss. A technical review team should be funded by federal, state, and local sources to assist the municipality in the establishing of ordinances and in the review of proposed developments.

C. Impact Assessment

The essential purpose of the recommended ordinances is to minimize the increase of runoff from agricultural lands attempting to maintain to the extent possible the natural runoff conditions. This action will tend to eliminate storm related discharges to surface waters and reduce the potential for flooding.

A secondary impact of the implementation of these ordinances will be increased costs of agricultural land use.

Salt Storage and Application

A. Technical Considerations

1. Existing and Future Conditions

Salt (sodium chloride) is used in Southern Maine to achieve bare pavement conditions during the winter months. Salt will continue to be used as long as the bare pavement policy is mandated and other highway de-icing chemicals are not used because of their prohibitive cost. Surface water quality problems have not been associated with highway de-icing salt uses. However, a small number of individual water supplies have been found to exceed chloride standards.

2. Alternatives and Recommendations

Since use of highway de-icing salt compounds will continue, general guidelines have been presented for the storage, handling and application of these compounds. These guidelines are sensitive to the conflicting policies of bare pavements in winter and clean water and attempt to strike a balance between the two.

B. Management Considerations

1. Existing Conditions

The State and municipalities have the authority and responsiblity to maintain roads and highways in the region. The State has established guidelines and procedures for highway de-icing salt storage and application, and has developed educational and training programs for local operators.

2. Alternatives and Recommendations

Existing Maine laws should be investigated for enforcement powers related to regulate the use of highway de-icing compounds. In the absence of enforceable regulations and state level standards adequate

to protection of the environment and compatible with policies related to winter driving conditions, MDEP, MDOT and the other agencies should collaborate on their development. This program development should include a series of checks and balances through required reporting, surveillance and/or sampling, and analysis.

C. Impact Assessment

Continued use of highway de-icing for road maintenance in the winter months will present a potential threat to surface and groundwater quality. Following recommended practices for storage and application of the salt will minimize the potential for water quality degradation while maintaining bare pavement policy. These practices may tend to increase the costs of providing facilities for salt storage; however, costs may be partially offset by the resulting conservation of salt.

Runoff from Construction Activities

A. Technical Considerations

1. Existing and Future Conditions

Because of the need to remove the cover vegetation and leave areas exposed during many construction projects, the potential for erosion and sedimentation is great. The soil loss can be extensive and can result in significant degradation of surface water through sedimentation and siltation. Since population projections indicate continued growth and development, construction activities will remain a potential source of water pollution.

2. Alternatives and Recommendations

Since erosion and sedimentation in the study area is principally site specific, each situation or occurrence must be considered in relationship to its own setting. The two major factors to be considered in erosion and sediment control are:

a. Reduction of the raindrop impact energy which reduces its dispersing and eroding power below the critical force and

b. Reduction of the velocity of the surface runoff which, in turn, lessens its abrading power and transporting capacity.

Probably the most effective method of reducing the impact energy of raindrops are those procedures which cover the soil; e.g., natural plant cover, mulching, temporary cover crops and paving or covering with non-erodable materials. If the precipitation falling on the site is not allowed to pick up velocity as it runs off then its erosive power is curtailed. Shortening the length of slope is one of the most effective methods of controlling runoff velocities. This shortening can be accomplished by various techniques such as structural measures, cropping or management patterns, or tillage practices.

It is recommended that the most cost-effective manner of instituting methods for controlling runoff from construction activities is through local land use regulatory controls.

It is recommended that the most cost-effective manner of instituting methods for controlling runoff from construction activities is through local land use regulatory controls.

B. Management Considerations

1. Existing Conditions

Construction controls are implemented at all levels. The Federal government imposes controls through the Federal Highway Administration, and the Corps' activities. The State imposes controls through the Site Location Law, the Great Ponds Law, the Wetlands Act, Stream Bulldozing, and Mandatory Shoreland Zoning. The Saco River Corridor Commission imposes controls on construction activities. Local controls are imposed through subdivision and zoning regulation.

2. Alternatives and Recommendations

Since the requisite legal authority to regulate construction activities exists, no institutional change is recommented. Municipalities should review, revise, and adopt appropriate versions of the Model Performance Standards for control of runoff and soil loss.

A technical review team should be funded by Federal, State, and local sources to assist the municipality in the establishment of ordinances and in the review of proposed developments.

C. Impact Assessment

The essential purpose of the recommended ordinances is to minimize the increase of runoff from agricultural lands, attempting to maintain to the extent possible the natural runoff conditions. This action will tend to eliminate storm related discharges to surface waters that may adversely affect water quality.

A secondary impact of the implementation of these ordinances could be increased costs for agricultural activities.

Petroleum Storage and Transfer

A. Technical Considerations

1. Existing and Future Conditions

From the evidence there is no question that petroleum products have the potential to contaminate water resources in the SMRPC 208 area. Furthermore, with the potential for more than 31 million gallons of #2 home heating fuel transferred in over 150,000 transactions and with over 16 million gallons of storage capacity within the 208 area, substantial opportunity for similar oil pollution will continue to exist for the foreseeable future. Assuming little change in present technological and other controls, spills and leaks will likely culminate in local long-term environmental degradation with little or no opportunity for corrective action.

Boating activity (specifically exhaust emissions) may not cause major adverse effects on lakes; however, support facilities (e.g., marinas selling oil and fule and doing repair work), accidents, and negligence in the handling of petroleum products may degrade water quality.

2. Alternatives and Recommendations

This planning effort did not address the large amount of technical control methods for the handling and distribution of petroleum products.

B. Management

1. Existing Conditions

Petroleum storage and transfer are currently managed by Federal, State and local governments. The Federal and State governments primarily regulate water transport, large on-land storage facilities, and discharge to groundwaters and surface waters. Local governments have the authority to control the siting of oil storage facilities adjacent to water bodies.

2. Alternatives and Recommendations

A State level program designed to identify the magnitude of petroleum related pollution should be developed. Applicable controls should be recommended and incorporated into legislative and regulatory programs. Local and regional input should be sought by the State in the design and implementation of the program.

C. Impact Assessment

As long as substantial volumes of petroleum products are handled, stored, transferred and consumed in the SMRPC 208 area, contamination of water resources is likely to continue. Assuming little change in present technological and management controls, spills and leaks will likely culminate in local long-term environmental degradation with little or no opportunity for corrective action. However, a State level program designed to improve the handling of petroleum products will minimize the potential for petroleum related pollution in Maine.

SOUTHERN MAINE REGIONAL PLANNING COMMISSION
AREAWIDE WASTE TREATMENT MANAGEMENT PLAN

IMPACT ASSESSMENT MATRIX ARUNDEL

LEGEND

- ■ VERY NEGATIVE
- □ NEGATIVE
- □ NO IMPACT
- ■ POSITIVE
- ■ VERY POSITIVE

FACTORS IMPACTED

		TECHNICAL & MANAGEMENT ALTERNATIVES	NATURAL FACTORS																							CULTURAL FACTORS												COST COMPARISON	
			LAND		SURFACE WATERS									GROUNDWATER						AIR				FLORA			FAUNA				LAND USE					Recreation		SOCIAL						ECONOMIC					
			SOIL	UNIQUE PHYSICAL FEATURES	DISSOLVED OXYGEN	BIOLOGICAL OXYGEN DEMAND	SUSPENDED SOLIDS	NUTRIENTS	DRINKING WATER SUPPLY	TEMPERATURE	TURBIDITY	BACTERIA & VIRUSES	Toxic Substances & Heavy Metals	CHLORIDES	NITRATES	PHOSPHATES	HEAVY METALS	BATERIA & VIRUSES	DRINKING WATER SUPPLY	PARTICULATES	NITROGEN OXIDES	SULFUR OXIDES	TOXIC SUBSTANCES	NATURAL VEGETATION	MANAGED VEGETATION	AQUATIC VEGETATION	BIRDS	LAND ANIMALS	FISH & SHELLFISH	FOOD CHAINS	Open Space, Wetlands, Forest	AGRICULTURAL	RESIDENTIAL	COMMERCIAL	INDUSTRIAL	FISHING	WATER RECREATION	POPULATION GROWTH	DEVELOPMENT PATTERN	EMPLOYMENT	HEALTH & SAFETY	INSTITUTIONS	WATER SUPPLY	RECREATION	FISHING	MANUFACTURING	CAPITAL COST	Operation/Maintenance Cost
WASTE SOURCES	SEWAGE DISPOSAL COLLECTION & TREATMENT SYSTEMS	Treatment Alternatives: NO ACTION																																															
		Regional Alternatives																																															
		Sewer Extensions																																															
		Management Alternatives: USE EXISTING AUTHORITY																																															
		Management Alternatives: DEVELOP NEW AUTHORITY																																															
	SEWAGE DISPOSAL SUBSURFACE SYSTEMS	Treatment Disposal Systems: SUBSURFACE WASTE DISPOSAL																																															
		Treatment Disposal Systems: ALTERNATIVE TOILETS																																															
		Treatment Disposal Systems: SEWER EXTENSIONS																																															
		Management Alternatives: USE EXISTING AUTHORITY																																															
		Management Alternatives: STRICT CODE ENFORCEMENT																																															
		Management Alternatives: MAINTENANCE PROGRAM																																															
		Management Alternatives: REGIONAL CODE MANAGEMENT																																															
	SEPTAGE DISPOSAL	Disposal Methods: NO ACTION																																															
		Disposal Methods: TREATMENT PLANT																																															
		Disposal Methods: LAND APPLICATION																																															
		Disposal Methods: INCINERATION																																															
		Management Activities: USE EXISTING AUTHORITY																																															
		Management Activities: REGIONALIZATION																																															
	SLUDGE DISPOSAL	Disposal Methods: NO ACTION																																															
		Disposal Methods: LAND APPLICATION																																															
		Disposal Methods: INCINERATION																																															
		Disposal Methods: COMPOSTING																																															
		Management Alternatives: USE EXISTING AUTHORITY																																															
		Management Alternatives: REGIONALIZATION																																															
	SOLID WASTE DISPOSAL	Disposal Methods: NO ACTION	■								■			■	■	■	■														■									■					■		
		Disposal Methods: SOURCE SEPARATION																																					■										
		Disposal Methods: BAILING OR SHREDDING									■			□	□	□	□														□															■		
		Disposal Methods: INCINERATION	■								■			■	■	■	■														■															■		
		Disposal Methods: INCINERATION WITH HEAT RECOVERY	■								■			■	■	■	■														■															■		
		Disposal Methods: SANITARY LANDFILL																																															
		Management Alternatives: USE EXISTING AUTHORITY																																															
		Management Alternatives: REGIONALIZATION																																															

SANFORD

WASTE SOURCES ADDRESSED	PRIORITY *
SEWAGE DISPOSAL - COLLECTION AND TREATMENT SYSTEMS	●
SEWAGE DISPOSAL - SUBSURFACE SYSTEMS	◉
SOLID WASTE DISPOSAL	◉
INDUSTRIAL WASTE DISPOSAL	◉
RUNOFF FROM DEVELOPMENT	●
RUNOFF FROM AGRICULTURE	⊕
SALT STORAGE AND APPLICATION	⊕
RUNOFF FROM CONSTRUCTION ACTIVITIES	⊕
PETROLEUM STORAGE AND TRANSFER	⊕

Sewage Disposal - Collection and Treatment Systems

A. Technical Considerations

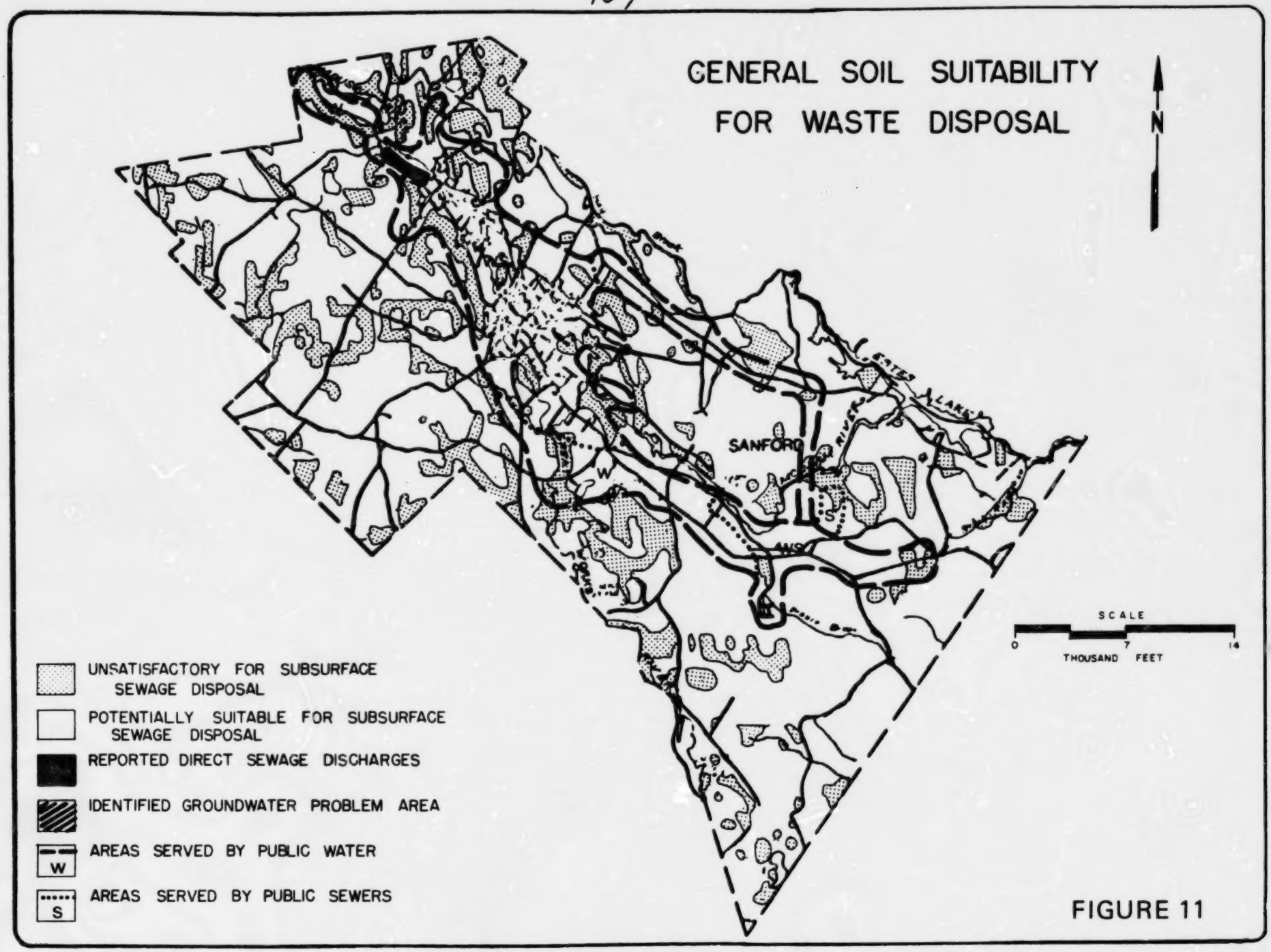
1. Existing and Future Considerations

The Town of Sanford contains the Villages of Springvale, Sanford, and South Sanford. The Sanford Sewer District's system extends into all three areas, with about 15,000 of the Town's 18,675 residents served by the collection and treatment system. The existing wastewater collection system is composed of over 33 miles of separate sanitary sewer and 12.2 miles of combined sewers serving roughly 1,400 acres. Parts of the system are quite old and subject to high infiltration. Separate storm sewers exist in some sections of Town where catch basins have been separated from the sanitary sewer system. Most of the existing combined sewers are old and date back to the late 1800's. The town has an ongoing program of stormwater separation, but the majority of the system must be considered as predominately combined.

Though a large portion of the Town of Sanford is already sewered, the adequacy of existing sewerage is still a problem. The problem stems principally from excessive volumes of stormwater inflows and infiltration collected in the system and then either transported via interceptors to the treatment plant, or bypassed at various points to watercourses in the Town.

Problems with both the nature and condition of existing sewers (and resultant infiltration and inflow of stormwater) exist in both the Village of Springvale and the Village of Sanford. Recommended areas requiring serious attention (separation and/or rehabilitation) are discussed in the Plan.

● HIGH PRIORITY ◉ PRIORITY ⊕ LOW PRIORITY


GENERAL SOIL SUITABILITY
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THOUSAND FEET
UNSATISFACTORY FOR SUBSURFACE SEWAGE DISPOSAL
POTENTIALLY SUITABLE FOR SUBSURFACE SEWAGE DISPOSAL
REPORTED DIRECT SEWAGE DISCHARGES
IDENTIFIED GROUNDWATER PROBLEM AREA
AREAS SERVED BY PUBLIC WATER
AREAS SERVED BY PUBLIC SEWERS

FIGURE 11

In addition to those already-sewered areas which require remedial work or new construction of separate sewers, there are newly developed areas which are now--or soon will be in need of sewers. Some of these areas are troubled with malfunctioning septic tanks. High on the priority list are such areas as:

- the School Street area just east of the Mousam River, and
- the area adjacent to Rte. 4 near the intersection of High Street and Grammer-New Dam Roads.

Unsewered areas along Rte. 109 west of the airport and neighborhoods peripheral to already sewered areas in both Springvale and Sanford should also be considered as future service areas.

The built-up areas on the shores of both Estes Lake and Bauneg Beg Pond have previcusly been identified as areas requiring sewerage. This was because of their suspected contribution of pollutants and nutrients (nitrogen and phosphorous) to these lakes. Recent analysis, however, suggests that the domestic septic tanks serving the homes in these lake shore areas are not the principal sources of accelerating eutrophication of these lakes. In the case of Estes Lake, the major sources of nutrients are the upstream effluent from the stabilization lagoons and background runoff; at Bauneg Beg Pond natural runoff from forested watersheds is the major source of nutrients degrading the Pond's water quality.

Sanford's wastewater treatment plant, licensed by NPDES permit No. ME0100617 and Maine Waste discharge license No. 870, is unique among the treatment systems operating in the "208" area. It consists of four stabilization ponds built in 1962 which, in total, occupy 131 acres and are operated as pairs in parallel with each other. The effluent from each pair of ponds is discharged unchlorinated to the Mousam River, a class C waterway. The Mousam, below the treatment facility's outfall, has been classified as a water quality limited stream. The system produces very little sludge.

The lagoons are designed to handle an average flow of 5 mgs. Actual flow rates average about 3.2 mgd. The lagoons service a combined sewer system, peak flows have reached as high as 6.4 mgd. There are by-passes at the facility; periodic hydraulic overloads have had a minor adverse impact on effluent quality. In addition to domestic and commercial wastes, the treatment facility receives about 1.8 mgd of industrial effluent, of which about 1 mgd is cooling water. Fibers from textile mills have periodically had a minor adverse impact on lagoon performance.

At the time of the writing of this report, information describing influent characteristics was not available. The effluent contains, on average, about 18 mg/l of BOD and 23 mg/l of suspended solids. The treatment facility has failed to comply with its NPDES permit discharge limitation of mg/l of total suspended solids during the summer months. Suspended solids have been as high as 50 mg/l. Coliform counts in the effluent have been high--ranging from 2,125 to 22,000 per 100 ml. The following effluent characteristics are based on a single grab sample: total kjeldahl nitrogen-8.5 mg/l, NO_3 + N-0.01 mg/l, total phosphorous 2.2 mg/l (about 60/lbs/day at a flow of 3.2 MGD).

The facility has had some operational problems:

a. system personnel have not, in the past, attended any type of formal training program.
b. seepage from pond #4 reaches the Mousam River, "short circuiting" the treatment process.
c. algae growth is a problem during the summer.
d. in August of 1974 and 1975, the lagoons went completely anaerobic, causing some odor problems. The source of the problem may have been the algae growth.

Estes Lake, an impoundment of the Mousam River downstream of the Sanford treatment plant is eutrophying. Because the facility discharges to an impoundment and is in a water quality limited segment, the Maine Department of Environmental Protection is requiring that the treatment facility meet the following load allocation parameters:

a. BOD_5 - 560 pounds per day
b. total suspended solids - 560 pounds per day
c. total phosphorous (as P) - 17 pounds per day (50 lbs/day as PO_4)
d. fecal coliform - 20 colonies per 100 ml.

The Mousam River rises in Square Pond on the Acton-Shapleigh line and flows southeasterly through Sanford and Kennebunk to the Atlantic Ocean. There are several point-source wastewater discharges entering the river within the Sanford area including:

Discharge	Location
Combined sewer overflows, Sanford	Approximately 6 points between Mill Street in Springvale and the Mousam River pumping station near the treatment plant.
Sanford Sewerage District Lagoons	2.4 miles upstream from confluence with Middle Branch

The Mousam River (West Branch) is specified in Maine's water quality standards as Class B-2 from the dam at Emery's Mills to a point about one-half mile above Mill Street in the Springvale section of Sanford, Class C downstream to its junction with the East Branch, Class B-1 to the Route 9 bridge, and Class SB-2 in the lower estuary. Estes Lake, an impoundment of the Mousam River downstream of the center of Sanford, is classified as a Lake Stress Quality impoundment. A Lake Stress Quality impoundment is one which presently may not be in violation of its assigned classification but cultural eutrophication may preclude certain uses that are normally associated with its assigned use. The Mousam River from the outlet of the Sanford Sewerage District lagoons to the head of tide (RM 12.1 to RM 0.0) is also designated as a Water Quality Segment, meaning that applicable water quality standards are not expected to be met even after application of required effluent limitations.

Water quality surveys of the Mousam River were conducted in 1973 and again in 1975 by the Maine Department of Environmental Protection. Samples in 1975 were taken at twelve stations between the outlet of Mousam Lake in Shapleigh and the U.S. Route 1 bridge in Kennebunk. All stations were sampled on June 10 and September 15, 1975. The data

show that dissolved oxygen concentrations did not fall below 75 percent saturation (Class B-1 requirement) at any location on either date; the minimum value recorded was 7.8 mg/l. Although BOD loads did not cause violation of the DO standards for the river during the 1975 sampling program, streamflows were substantially higher than the 7-day, 10-year minimum flow (estimated at 2.69 cfs at the West Kennebunk gage)* which is to be used in determining assimilative capacity. Because of flow regulation by Square Pond and Mousam and Estes Lake it is difficult to estimate the minimum discharge at points above the West Kennebunk gage. Nevertheless, DEP's 1973 report on the Mousam River concluded that there was no assimilative capacity for more waste discharge to the river. Under minimum flow conditions, then, it is probable that the present BOD loads from the Sanford wastewater treatment facility (467 lb/day) would cause violation of DO standards. For example, on August 14, 1973 the flow in the Mousam River at West Kennebunk (river mile 3.9) was 20 cfs. Average discharge of 35 years of record is about 180 cfs. Dissolved oxygen just upstream of the dam at R.M. 3.9 was 5.4 ppm and at 60% saturation. This meets B-2 standards but not B-1 standards which require 75% saturation. Below the dam at R.M. 0.2 the D.O. was 8.2 and at 91% saturation. At the outlet of Estes Lake (R.M. 10.1) the D.O. was 6.5 and at 76% saturation. At higher flows super saturation often occurs below the outlet of Estes Lake. From this data it appears a D.O. sag occurs at river mile 3.9. Examination of water records for the water year October 1973 to September 1974 indicate the lowest mean flows occur in July and August (55 cfs and 30.5 cfs respectively). However, in October, the flow was 9 to 10 cfs on 10 days. The flow regulation of power dams upstream are largely responsible for these low flows. Water quality sampling on September 15, 1975 at R.M. 3.9 indicated the D.O. to be 9.3 ppm with a flow of about 80 cfs. Since the Mousam is not a free flowing river, prediction of how much BOD load can be assimilated and where the minimum allowable D.O. would occur cannot be done with any confidence. Additional water quality sampling should be done in October, or other times when the flow is less than 10 cfs to better define the effects of wastewater loads on the dissolved oxygen in the complex river system.

During the 1975 DEP water quality survey of the Mousam River, none of the samples taken from the Class B-1 portion of the Mousam River (outlet of Estes Lake to head of tide) met the B-1 requirement for total coliform bacteria and two failed to meet the fecal coliform standards. There were no violations of standards for either fecal of total coliforms in the Class C portion of the river flowing through Sanford. The Sanford Sewerage District lagoons do introduce coliform bacteria to the Mousam since the effluent is not chlorinated, but no significant effects on coliform levels downstream were apparent from the 1975 survey data. The non-point source consultant has identified areas where subsurface sewage disposal systems may be contributing to observed coliform levels, although the overall impact is not considered significant.

*Located in Sanford between Estes Lake dam and Old Falls dam.

2. Alternatives and Recommendations

The highest priority with regard to the collection subsystems is to perform a detailed sewer system evaluation survey. (This work is in progress and probably will be completed by the time this report is printed.) This survey is needed to define specific locations and the magnitude of infiltration, to provide better information on combined sewer overflows and their control and sources of inflow to the collection system and to develop a program to reduce infiltration/inflow to a cost-effective level. Because of the water quality limited status of the Mousam River, the sewer system evaluation survey should also evaluate the water quality impact of separation of combined sewers.

The only near-term extension of the wastewater collection system is on the lower end of School Street where the facility plan indicates recent development is located on land considered unsuitable for on-site sewage disposal. This area could sewer by gravity to the Mousam River interceptor. Sewering around Estes Lake or Bauneg Beg Pond is not recommended in view of the fact that effluent from subsurface sewage disposal is not a controlling factor in the eutrophic condition of these water bodies. Extension of sewers to these remote areas of the Town would be very costly.

It is recommended that extensions to the Sewer District's system should be based primarily on need, i.e., to relieve a health hazard or water pollution. With a waste load allocation restriction at the treatment facility, increasing the service area or adding new services within the existing service area is analogous to filling a cup of water; additional services gradually fill the cup to capacity. The only way to reduce the amount (or load) to the cup and still increase services is to increase the level of treatment. Industrial wastes are of particular concern with regard to "filling the cup" since their waste loads can be many times the strength of domestic wastewater.

In order to minimize future investments in extensions of the wastewater collection system, the Town should consider including Appendix 1 of the State Plumbing Code as part of the Town's zoning ordinance, and use both to determine the minimum lot size where on-site systems are used. For example, if the minimum lot size as determined by the existing zoning ordinance were 1 acre--43,560 sq. ft.--and the soil indicated 80,000 sq. ft. lots are required (by Appendix 1), the larger of the two criteria would be used to determine the minimum lot size.

Alternatives Developed in the 201 Facility Plan

The Mousam River is classified as water quality limited from the Sanford sewage treatment facility to the head of tide. Quoting directly from the Facilities Plan:

"The State of Maine Department of Environmental Protection (DEP) has determined that, because of the impoundment of Estes Lake downstream, effluent from the Sanford Sewerage District will have to meet the following load allocation parameters:

- Biochemical oxygen demand (BOD): 560 pounds per day
- Suspended solids (SS): 560 pounds per day
- Total Phosphorous: 17 pounds per day (as P)
- Fecal Coliform: 20/100 mililiters (ml.)

These limits have been imposed to reduce the effect of the effluent on the quality of Estes Lake, particularly regarding deterioration of the pond by the apparent overstimulation of flora in the lake."

"As the ponds are apparently being operated in a proper manner, it would be unlikely that major improvements in effluent quality could be realized by modification of the techniques currently in use."

"Altered operation of the lagoons would not be sufficient to meet these effluent requirements."

Modifying the operation of the stabilization ponds to improve effluent quality will be discussed in more detail later in this section.

According to the Facilities Plan, regional alternatives were not practical since no other population centers are reasonably close to Sanford.

Seven local treatment alternatives, all with effluent discharge upstream of Estes Lake, were considered in the Town's Facilities Plan.

1. Land application - not considered practical because of the large tract of land required for effluent application and winter storage. Capital costs - $17,376,000. Operating and maintenance costs-- $225,000/yr.

2. Effluent reuse - not considered practical at this time. Capital costs - $5,358,000. Operating and maintenance costs - $475,000/yr.

3. Coarse bubble bottom aerated lagoons - the selected alternative. The proposed Advanced Wastewater Treatment System includes the following unit operations and processes: 2 coarse bubble aerated lagoons (operated in parallel), the existing stabilization ponds (two pairs in parallel), chemical coagulation with lime and ferric chloride and sedimentation for phosphorous removal, recarbonation for pH control, mixed media (anthracite coal and sand) filters, and disinfection by ozonation. Capital costs - $4,454,000. Operating and maintenance costs - $409,100/yr.*

4. Fine bubble bottom aerated lagoons - more expensive than the coarse bubble bottom aerated lagoons. Capital costs - $5,082,000. Operating and maintenance costs - $388,000/yr.

5. Trickling filters - more expensive than the coarse bubble aerated lagoons. Capital costs - $6,733,000. Operating and maintenance costs - $473,000/yr.

*The O&M costs listed here are somewhat more than the costs used later in this section to compare alternatives. Paraphrasing the Facilities Plan, the costs used here are based on nationwide averages; the costs used later in this section"...are specific for Sanford and reflect 40-hour staffing, prevailing utility rates, chemical consumption, and general operating conditions."

6. Activated sludge - more expensive than the coarse bubble aerated lagoons. Capital costs - $6,436,000. Operating and maintenance costs - $531,500/yr.

7. Physical - chemical treatment - effluent may not meet phosphorous standards and the process is more expensive than the coarse bubble aerated lagoon. Capital costs - $6,493,000. Operating and maintenance costs - $562,000/yr.

Other Potential Treatment Alternatives (Not in Facilities Plan)

As previously mentioned, stringent limitations have been placed on the quality of the effluent from the Sanford stabilization ponds. However, the state-imposed waste load allocation and, consequently, the projected need for advanced wastewater treatment in Sanford are based on the assumption that the stabilization pond effluent would be discharged upstream of Estes Lake and would be discharged continuously throughout the year. Several other treatment techniques, however, may be more economical while still preserving acceptable water quality in Estes Lake and the Mousam River below Estes Lake:

1. Discharge of Sanford's stabilization pond effluent below Estes Lake, such as below Old Falls Dam with additional BOD removal afforded by the proposed coarse bubble aeration lagoons.

2. Discharge of Sanford's stabilization pond effluent above or below Estes Lake but restricting the discharge to periods other than mid-June to mid-August, with additional BOD removal afforded by the proposed coarse bubble aeration lagoons.

The State of Maine associates the eutrophication problem in Estes Lake with the amount of phosphorous contained in the effluent from the Sanford stabilization ponds. The Town's Facility Plan recommends tertiary treatment (lime coagulation, sedimentation, recarbonation, multi-media filtration) with discharge upstream of Estes Lake to control the eutrophication problem in the lake and to meet the State imposed phosphorous waste load allocation parameter of 17 pounds per day. The cost of the units associated with phosphorous removal only (including the present worth of the operating and maintenance costs) is $2,880,000.

Treatment elements were assigned a useful service life of 25 years. Straight line depreciation was used to determine the salvage value of the equipment at the end of the 20-year planning period.

Of particular concern is the high annual cost of operation and maintenance of the phosphorous treatment facility, estimated to be $130,500/yr and $220,700/yr for all treatment facilities recommended in the Facilities Plan. This is about $200,000/yr more than is now expended for operation-maintenance of the existing facility.

Another consideration is the time it will take for improvements to take place in Estes Lake if phosphorous removal is instituted. It is possible that over the years, bottom deposits have accumulated enough nutrients to sustain algae growth even though costly tertiary treatment is instituted. For example, an impoundment typically "overturns" twice a year--in the spring and fall--as a result of temperature destratification. Nutrient concentrations, which are generally higher just above the bottom deposits than in the top few feet of depth of water, are brought to the

surface in the "overturn." Water quality sampling conducted by the Maine DEP in 1975 illustrates such a phenomena. On September 15, 1975, total phosphorous in the Mousam River below the waste treatment facility, but before Estes Lake, was 0.18 ppm. On that day, the total phosphorous below Estes Lake near Witchers Mill Road was 0.35 ppm. Thus, there appears to be another potential significant source of phosphorous. It is possible that this source is the nutrient rich bottom deposits. If so, it may take many years, for conditions in Estes Lake to return to that found prior to the construction of the lagoons in Sanford even though tertiary treatment was utilized.

But, as mentioned previously, two other alternative treatment schemes may reduce the water quality problems in Estes Lake.

a. Discharge of stabilization pond effluent (without tertiary phosphorous removal) downstream of Estes Lake.

b. Discharge of stabilization pond effluent (without tertiary phosphorous removal) upstream of Estes Lake but restricting the discharge to periods other than mid-June to mid-August (months when algae growth is a particular problem in Estes Lake).

The cost of constructing and maintaining a five-mile outfall necessary to transport the effluent below Estes Lake is estimated to be $1,517,000, considerably lower in cost than the tertiary treatment alternative. By bypassing Estes Lake, the need for tertiary phosphorous removal could be eliminated* but this alternative does raise several questions:

1. Although the phosphorous from the stabilization ponds bypass Estes Lake, presumably then reducing the eutrophication problem, what effect does this phosphorous then have on river quality downstream of the discharge point. Although there is little information available concerning the downstream impoundments, it is known that they are small and recreational use is limited. According to the National Eutrophication Study survey conducted by EPA in 1972 and 1973, phosphorous accumulation in Estes Lake is quite low; 94 percent of the estimated 33,320 lb. annual phosphorous loading from upstream sources passed through the lake. Under these conditions of low phosphorous retention in Estes Lake, it is doubtful that the trophic state of the much smaller downstream "impoundments" would change appreciably with discharge of the Sanford treatment facility effluent below Estes Lake.

2. The Town of Kennebunk would have to grant an easement for construction of the outfall sewer located in Kennebunk.

   Concerning alternative (b), if the ponds are drawn down sufficiently beforehand (by the end of May) the ponds can store at least two months of flow. Assuming that the discharge of phosphorous is a

*If the portion of the river between Old Falls Dam and the dam in West Kennebunk is considered an impoundment which is more than 10 acres than by DEP regulation, phosphorous removal could be required for even this alternative.

problem only during the summer months (when conditions are ideal for lake flora to utilize the phosphorous), it may be possible to alleviate the problem by temporarily withholding the discharge to the Mousam River. The amount of phosphorous eventually reaching the lake would not be reduced, but the timing of its arrival would be changed. If the phosphorous is released when either the flora would be unable to utilize it or when the recreational season is over, the magnitude of the algae problem could be reduced.

The operation of stabilization ponds and the control or prevention of lake eutrophication are not exact sciences. The preceding discussion reflects these uncertainties. As mentioned previously, it appears that Maine DEP regulations may preclude the use of this alternative (unless a variance were granted) since the discharge is to an impoundment with a surface area greater than 10 acres.

Resolving this treatment issue is not an easy one. This 208 plan attempts to provide alternatives to all concerned parties which will meet water quality goals at the lowest cost. The outfall sewer below Estes Lake meets these criteria but would involve delays in implementation (easements, variances as needed from Maine DEP, involvement with Kennebunk officials).

The Southern Maine Regional Planning Commission (SMRPC) staff met with Maine Department of Environmental Protection (MDEP) officials, U.S. Environmental Protection Agency (EPA) officials, Sanford Sewer District officials, and Estes Lake Association President to discuss the above analyses. In addition to these meetings, SMRPC submitted the following comments regarding the Sanford facility plan:

1. The decision to completely separate stormwaters from the combined sewers should be re-evaluated in terms of actual pollution loading and water quality impact on the Mousam River and Estes Lake.

   Information developed through the 208 program indicates that there would be virtually no reduction in phosphorous input to the river-lake system by eliminating combined sewer overflows through complete stormwater separation. Also, BOD, and suspended solids loading from stormwater discharges may have adverse impacts on a short term basis associated with storm events. The results of complete storm separation would be a negligible water quality benefit for a cost of approximately $5 million.

   A more effective approach to determine how to control combined sewer overflows is to match storm frequency and intensity which the frequency and duration of combined sewer overflows. This would include monitoring of all overflow points in the system. This information in conjunction with the sewer system evaluation survey should clearly indicate applicable controls for the different portions of the sewer system. These controls may involve a combination of sewer separation and storage and treatment of overflows.

   Before stormwater separation for the purpose of controlling or eliminating combined sewer overflows proceeds, a complete evaluation of applicable controls (other than separation), pollution loading, and water quality impact should be accomplished.

2. A process for evaluating the water quality impact of the Advanced Wastewater Treatment (AWT) system selected for Sanford should be established as an integral part of the program leading to construction and operation of the treatment facilities. Such a process should be oriented towards analysis of the effectiveness of phosphorous removal and the impact of phosphorous on Estes Lake.

   Advanced wastewater treatment is required for Sanford's wastewater discharge through DEP mandated effluent limitations which are predicted on water quality constraints provided by the downstream impoundment, Estes Lake. However, significant improvement in Estes Lake must be demonstrated to justify the continued operation and expense of the AWT facilities, particularly those portions of the facilities directly related to phosphorous removal. Pre-operational and operational water quality surveys should include adequate influent and effluent monitoring and water quality sampling of the Mousam River to Estes Lake, and Estes Lake itself.

   Alternatives have been investigated under the 208 program that eliminate sewage treatment related phosphorous discharge to Estes Lake, thereby circumventing the necessity for AWT. These alternatives may have to be reconsidered if the planned AWT is not effective in terms of water quality improvement.

3. Sewering Estes Lake and Bauneg Beg Pond is not warranted based on water quality or cost considerations. Information on Estes Lake indicates that subsurface sewage disposal for the fifty (50) homes proximate to the lake contributes much less than 1% of the total nutrient loading to the lake system. Similarly, estimates for Bauneg Beg Pond indicate a phosphorous loading from the nine (9) permanent residences and one hundred and twenty (120) seasonal homes within 300 feet of the pond as an order of magnitude less than the phosphorous contribution from other sources. The cost of over $1.1 million to extend interceptors to the two lakes plus the high cost of collector sewers (a local cost) at the lakes would result in a negligible improvement in water quality. The Maine State Plumbing Code and the Malfunctioning Sewage Disposal Units Law provide adequate tools to correct existing lakeside pollution problems and to largely prevent future problems associated with development on subsurface sewage disposal. In fact, moderate or restricted development meeting plumbing code criteria for sewage disposal is preferrable to extensive development on sewer that would tend to increase surface runoff to the lakes.

4. The projected BOD loading should be re-evaluated before serving as a basis for design of the treatment facilities. First, the projected BOD loading should reflect the removal of Estes Lake and Bauneg Beg Pond as future service areas to the existing treatment facility. Secondly, the projection has been based on rather sparse data that should be supplemented by a sampling program including pond influent and effluent BOD, suspended solids, and phosphorous sampling to determine more precisely present pond performance efficiencies and to provide a basis for projected future BOD loadings.

   Thirdly, such projections for industrial BOD loadings should recognize the existing constraints on the Sanford Water District in providing adequate quantities of water for industrial growth.

As a result of the meetings and the submitted comments, State and Federal officials have re-evaluated an earlier decision to approve the tertiary treatment alternative with discharge above Estes Lake. MDEP staff analyzed water quality data regarding phosphorous loadings to Estes Lake and concluded that phosphorous removal as proposed (discharge upstream of Estes Lake) would not significantly improve lake water quality. Therefore, all agencies concerned have agreed that the consultant for the Sanford Sewer District will investigate the following four alternatives for treatment of Sanford's wastewaters:

1. Storage of the effluent during periods of low flow and discharge during high flows following phosphorous removal. Since discharge will only occur during months of high flows chlorine should be utilized as the method of disinfection in this alternative only.

2. Biological removal of phosphorous rather than chemical, with discharge to the Mousam River above Estes Lake.

3. Discharge below Estes Lake with and without phosphorous removal.

4. Discharge below Old Falls Pond <u>with</u> and <u>without</u> phosphorous removal.

These alternatives will be investigated during Step 2 of Sanford's program of facility development. Other elements of the construction program not directly related to the above treatment alternatives will proceed simultaneously.

B. Management Considerations

1. Existing Conditions

The Sanford Sewer District owns and operates the wastewater collection and treatment system in the Town of Sanford.

2. Alternatives and Recommendations

The following management methods were considered and discussed in the management section of the 208 plan.

a. One single regional sewer district
b. County management of all facilities
c. Management by watershed
d. Management by sewer district for each population center
e. No change in the institutional arrangement

Although a single regional sewer district, county management, or other areawide/regional management agency would tend to reduce overall administrative costs and improve consistency in the provision of collection and treatment services, the establishment of such new agencies requires extensive, new legislative and institutional frameworks. Consequently implementation of a new authority may require a long period of time. Also, individual towns would have a reduced ability for self-determination regarding a town's desires for municipal services and population growth.

The analysis of these potential management agencies resulted in the conclusion that the existing cities, towns, and sewer districts have the authority to design, construct, and manage wastewater collection and treatment facilities. In addition, by minimizing institutional changes, the existing agencies and officials that have participated in the development of the Plan will likewise participate in the immediate implementation of the Plan. Therefore, existing management agencies should continue to design, construct, and manage wastewater collection and treatment systems.

C. Impact Assessment

The alternatives developed in the 201 Facility Plan have been assessed in the 201 Plan. At this point, additional alternatives are to be investigated and will be assessed for their impact as part of the 201 program.

Sewage Disposal - Subsurface Systems

A. Technical Considerations

1. Existing and Future Conditions

Most of the rural areas in Sanford outside of the more heavily populated town center are unsewered and residents rely on individual on-lot systems for sewage disposal. Town officials have reported problems with malfunctioning septic tank systems in numerous areas, including segments of Deering Neighborhood Road, Oak Street, Hanson's Ridge Road, Route 202, Jefferson Road, Mount Hope Road, and the Estes Lake and Bauneg Beg Pond areas. Some of these areas with reported problems are close to the periphery of the existing wastewater collection service area and thus could be sewered fairly easily. Providing sewerage to the more distant outlying areas would be more difficult and expensive.

2. Alternatives and Recommendations

Subsurface sewage disposal must remain as the major treatment and disposal method for domestic sewage wastes for rural or unsewered areas in the 208 region (cost of public sewers in these areas is prohibitive). Where problems have been defined, sewer service has been evaluated as an alternative to subsurface sewage disposal systems (see Sewage Disposal - Collection and Treatment Systems). Additionally, alternative toilet systems may be used to reduce the potential impact of sewage wastes on soils and groundwater.

In order to minimize future extensions of the wastewater collection system in the future, the Town should consider adopting Appendix 1 of the State Plumbing Code (which provides guidelines for minimum lot sizes where on-site systems are used--this is not a regulation) as part of the zoning ordinance.

B. Management Considerations

1. Existing Conditions

Each town presently regulates subsurface waste disposal in accordance

with the State Plumbing Code. Each town has its own Local Plumbing Inspector (usually part-time) who is responsible for issuing permits and enforcing the Code. Soils analysis is done by State certified soil investigators. They submit soils reports to the Plumbing Inspector and the State Department of Human Services. Maintenance is the individual's responsibility; however, there is no legal requirement for maintenance or inspection of systems after installation.

Malfunctioning sewage disposal systems are declared by law to be a nuisance and must be abated upon order by the municipality.

2. Alternatives and Recommendations

The Maine State Plumbing Code is protective of the environment through proper design and installation of subsurface sewage disposal systems. Alternatives considered to improve the effectiveness of the Code include improved State and local enforcement, mandatory maintenance and inspection, and regionalization of inspection and enforcement programs.

There should be stricter enforcement of the Plumbing Code. This can best be achieved by employment of a full-time, well qualified inspector hired to serve one or more towns. Maintenance should be required by the State and enforced through a local or regional inspection program. A funding program for rehabilitating systems should be investigated, utilizing EPA, Farmers Home Administration, Community Services Administration, and local banks as sources.

C. Impact Assessment

The major issue associated with this waste source is the increased local cost to implement an improved enforcement and inspection program related to the Plumbing Code. This moderate increase in cost will be balanced by improved reliability of subsurface sewage disposal resulting in improved water quality, health, and safety. A code enforcement program for Sanford would cost an estimated $12,000 per year. This cost for maintenance and enforcement of the Plumbing Code could save potential investments in expensive sewage facilities by assuring the reliability and effectiveness of subsurface disposal.

A secondary impact of this action will affect the homeowners with malfunctioning septic systems. Mandatory rehabilitation is expected to cost the homeowner of a malfunctioning system from $20 for pumping to $2,000 for replacement.

Solid Waste Disposal

A. Technical Considerations

1. Existing and Future Conditions

The Sanford disposal site is located on Rushton Street and has been in operation for 3-4 years. The city's previous disposal area was located across the street from the present site. The existing site has sufficient capacity for up to five years of operation. Approximately 16,300 tons of refuse are landfilled at the site each year. This figure includes both municipal and industrial wastes from Sanford

and the Springvale area. The site is operated as a landfill although the cover material is porous and inadequate in places.

The site is not secluded from view, but is located in a sparsely populated area. The site is located in an abandoned borrow pit which is surrounded by Terric Borohemist, Hinckley, and Walpole soils. The Terric Borohemist soil is swampy soil, and the water in this swamp has been grossly contaminated by both the present and abandoned dump sites. This water appears to be stagnant. The outlet of the swamp is the Mousam River, west of the two sites. The slow movement of the swamp waters toward the river and the dilution afforded by the river tend to minimize the impact of the leachate on the Mousam's water quality. Residences in the area are supplied with city water.

2. Alternatives and Recommendations

The Town of Sanford, along with the towns of Alfred, Dayton, and Lyman, was the subject of a regional analysis in 1974 conducted by the Edward C. Jordan Co., Inc. for the SMRPC. This report recommended that Sanford operate a landfill along with Alfred. This landfill would provide disposal capacity for a period of time during which incineration and other processing methods could be further analyzed.

The following table shows the yearly generation rates of Sanford, the potential waste contribution of the study towns of Wells, Kennebunk, Kennebunkport, and Arundel, and the potential contribution of towns adjacent to Sanford which are not included in the study region. The yearly generation ranges from 16,300 tons for Sanford alone to 36,840 tons if all the adjacent communities and the Wells region join together. These figures do not include wastewater sludges and wastes transported to non-municipal disposal sites. For the purposes of this evaluation, it has been assumed that annual landfill volume requirements are as follows: Sanford - 24 acre-feet; Sanford and Wells region - 44 acre-feet; Sanford and other adjacent towns - 34 acre-feet; entire region - 58 acre-feet. The estimated disposal area requirements for a life of 15 years, including the necessary buffer zone are: Sanford - 35 acres, Sanford and Wells - 60 acres, Sanford and other adjacent towns - 50 acres; entire region - 70 acres.

SOLID WASTE INVENTORY - TONS

SANFORD REGION

	Population	Annual	Daily Avg[1]	Daily Summer[2]
Sanford	17,600	16,300	44	48
Wells Region[3]	18,300	13,940	34	50
Adjacent Non-Study Towns	10,200	6,600[5]	15	26
		36,840	93	124

1. Daily average for year excluding summer months

2. Daily average during summer months

3. Wells, Kennebunk, Kennebunkport, Arundel

4. Lyman, Alfred, Shalpeigh, Acton, Lebanon, North Berwick

5. Based on per capita generation of 3.0 pounds per day, pro-rated for the seasonal population increase.

Of all the towns in the study region, Sanford possesses the greatest amount of suitable land for landfill. If the town wishes to commit itself to the purchase and development of some of this area, landfill remains the most economical method of disposal. The following table shows the estimated per ton cost of landfill disposal for Sanford operating alone as well as the costs with participation by neighboring communities. Also shown are the projected costs of operating a baler, shredder, or incinerator. Incineration with heat recovery offers the most economical alternative to landfill for the area. Sanford contains a substantial amount of industry which may be a market for the steam. The cost effectiveness of heat recovery depends on the maximum amount of energy being sold. A survey of refuse volumes, BTU values, and potential energy being sold. A survey of refuse volumes, BTU values, and potential energy markets in the Sanford region should be conducted to determine the feasibility of this method of waste disposal.

Additionally, leachate management or corrective methods should be investigated for their applicability to the Sanford site and implemented as soon as possible to mitigate the impact of leachate migrating off-site. Groundwater sampling may be required to further define the extent of leachate migration.

B. Management Considerations

1. Existing Conditions

The municipality of Sanford owns and operates a solid waste disposal site.

2. Alternatives and Recommendations

Sanford has the option of continuing to own and operate their disposal facility or joining a regional disposal system. A regional disposal district may be established by a special district or interlocal agreement. The cost estimates for waste disposal support selection of the regional system.

C. Impact Assessment

Although cost estimates indicate that a regional landfill is the most cost-effective method for solid waste disposal in Sanford, further study of the political and technical opportunity will be required prior to the development of a firm recommended course of action.

TABLE 9

ESTIMATED ANNUAL SOLID WASTE DISPOSAL COSTS

Municipality	Annual Generation	Sanitary Landfill	Baling or Shredding	Incineration	Incineration with Heat Recovery
Sanford	16,300	$ 81,500 $5/T	$146,700 $9/T	$260,800 $16/T	$142,600 $8.75/T
Sanford + Wells Region[1]	30,240	$136,100 $4.50/T	$241,900 $8/T	$438,500 $14.50/T	$211,700 $7/T
Sanford + Other Adjacent Towns[2]	22,900	$108,800 $4.75/T	$194,700 $8.50/T	$343,500 $15/T	$188,900 $8.25/T
Sanford, Wells Region + Other Adjacent Towns	36,840	$156,600 $4.25/T	$276,300 $7.50/T	$515,800 $14/T	$239,500 $6.50/T

1) Wells, Kennebunk, Kennebunkport, Arundel

2) Lyman, Alfred, Shapleigh, Acton, Lebanon, No. Berwick

In general, the alternative processing and disposal methods investigated in the plan primarily impact air and water quality. Sanitary landfills, regardless of the solid waste processing method selected, can impact water quality (groundwater and surface water) through generation of leachate. Incineration as a processing method reduces water quality impact while generating potential air quality impacts. Incineration with heat recovery has the same environmental impacts as standard incineration but reduces the economic impact (high cost of incineration) through revenues from sale of steam. Baling and shredding do not reduce water quality impact from leachate, but rather may provide economic benefit through increased landfill life. Source separation provides benefits through reduction of waste that must be disposed. These impacts are summarized in the Impact Assessment Matrix.

Industrial Waste Disposal

A. Technical Considerations

1. Existing and Future Conditions

It has been estimated that there are about 23 major industrial and commercial establishments that discharge wastewater to the Sanford sewerage system. The total industrial flow contribution is approximately 1.8 MGD, or 45 percent of the average daily dry-weather flow to the treatment facility. Brooks Woolen is the single largest wastewater contributor with an average flow estimated at 0.86 MGD.

Sanford's municipal wastewater treatment plant, consisting of four stabilization ponds, depends upon the same natural phenomena as biological wastewater treatment plants--namely, sedimentation with aerobic and anaerobic biological action. The main difference between processes in a stabilization pond and an activated sludge or a trickling filter plant is the degree of control. A stabilization pond does not have constant sludge and scum removal, nor does it have control over the oxygen available or the digestion of the sludge. A pond, therefore, can become septic and create an odor nuisance with gases causing a flotation of solids. There is also the possibility of surface algae growth, which generally is helpful in adding oxygen to wastewater during the daylight hours but upon dying creates more organic matter and thus adds to the septic problem.

Stabilization ponds, or lagoons as they have sometimes been called, have been used successfully by many industries with organic wastes. This includes pulp and paper, canning and other food-processing industries. They have also been used effectively to treat wastes from chemical and metal industries. But in all cases the lack of control creates some problems.

At the present time, the records of the Sanford facilities show no industry employs pretreatment facilities prior to discharge to the sewers, nor is there any control to prevent shock loads (of waste) or overloading of the treatment facilities. Lagoons can generally absorb shock loads and overloading well in comparison to many other forms of biological treatment.

The following table has been prepared using information currently available. The degree of compatibility of industrial wastes with municipal treatment facilities is based upon the information presented in Appendix A of the Plan as guidelines for preliminary judgement. Only industrial wastes have been considered in the following table; sanitary wastes from industry are, of course, acceptable and compatible.

Three printing firms have been omitted from the table because it has been assumed, on the basis of the size of these operations, that their wastes will primarily be sanitary. It appears that many of the industries in Sanford should be providing some degree of pretreatment. However, at the present time, industrial wastes do not appear to be causing any significant problems at the treatment facility. This does not imply that industry should take wholesale advantage of the buffering capacity of the lagoons. It is suggested that where a question as to the need for pretreatment arises, officials of the Sewer District should request that the industry in question provide at the industry's expense, an industrial waste survey. This would include information on flow, character and strength of each waste source.

Industrial wastewater also presently contains about 1 MGD of cooling water. Sprague Electric and American-Cyanamid are the two major contributors of cooling water. This practice of discharging cooling water to the sewer is expected to be discontinued in the near future. A discharge permit would be required to discharge cooling water to a surface water. If cooling water were separated out in these two industries, it would be discharged to the Mousam River.

The NPDES permit issued by EPA to Eastern Plastics is for three discharges of non-contact cooling water with a temperature limitation of 84 degrees F in each case. Clean cooling waters should not violate the C classification given to the Mousam River in this area. Sanitary wastewater and nickel-plating wastes from the plant are placed in the municipal wastewater system.

2. Alternatives and Recommendations

Elimination of non-contact cooling water from the wastewater collection system would reduce the wastewater flow by about 1 MGD. Such action would require those industries involved, primarily American Cyanamid and Sprague Electric, to obtain an NPDES waste discharge permit. In addition, water conservation measures at Brooks Woolen could reduce their wastewater flows from the major industries and commercial institutional enterprises on the town. Note that an allowance of about 400,000 gpd has been made for future industrial growth.

The major concern in meeting future needs is allowing expansion or acceptance of new industries to a point that the treatment facilities cannot meet the discharge limitations set by the Maine DEP. Unlike addition of domestic wastes, which slowly add to the wasteload, a few "wet industries" with a high volume, high strength wastewater could create such a situation. The Sewer District should consider instituting a wastewater permit system which would require that all industries (including existing ones) with a flow above a specified level, be required to submit at their cost, an industrial waste

TABLE 10

COMPATIBILITY OF WASTES FROM SANFORD INDUSTRIES

Category	Industry	Number of Employees	Waste Flow (gpd)	Conn. to Mun. Sewers	Comp.	Comp/w Pretreat.
Chemical - Plastic	American-Cyanamid	300	610,900	X		X
"	Eastern Plastic of Maine	100	14,700	X		X
"	Sanford Stamping	25	-	X	X	
"	York Heel of Maine	125	-	X		X
"	Miann Plastics	-	8,600	X		X
Metal - (fabricating)	Aerofab, Inc.	280	12,900	X		X
"	Eastern Air Devices	20	400	X	X	
"	Wasco Products, Inc.	125	18,800	X		X
"	E. I. Corporation	11	50	X	X	
Electrical	Sprague Electric Company	700	306,000	X		X
Textile	Brooks Woolen Co., Inc.	250	860,000	X		X
Textile	Sanford Weaving Company	100	5,000	X	X	
Textile	Jagger Brothers	-	5,800	X	X	
Textile	Springvale Sportswear	-	3,800	X	X	
Rubber and Textile	Lorna-Loom Carpet Company	-	3,600	X	X	
Shoes	Corey Shoe Company	100	3,700	X	X	
"	Laconia Shoe Company	-	2,600	X	X	
Dairy	Sanford Dairy	24	60,000	X		X
Concrete	Genest Concrete Works, Inc.	100	10,500	X	X	
Hospital	Goodall Hospital	-	22,600	X	X	
Wood	Baker Company	90	3,200	X	X	
Rubber	Central Retreading	-	2,900	X		
Laundry	Norge	-	8,600	X	X	
Laundry	Sanford	-	9,200	X	X	

survey report characterizing the flow and strength of the wastewater (including BOD_5, SS, phosphorous and heavy metals). This would be a first step in instituting an industrial cost recovery system.

B. Management Considerations

1. Existing Conditions

Controls are established and administered by the sewer district. Direct discharges into receiving water bodies are regulated through the NPDES permit system.

2. Alternatives and Recommendations

Administration of controls on industrial waste discharge to municipal and sewerage systems should remain with the existing management agencies. Enforcement of pretreatment standards and other requirements should be improved by establishing adequate sewer use ordinances and industrial waste survey programs as described in the Plan.

As part of the Federal involvement in water pollution abatement activities, funding programs should be expanded to research of heavy metal effects on riverine and estuarine environments. The State role in water quality sampling should be expanded to include adequate monitoring of discharges of toxic pollutants.

C. Impact Assessment

What is called for is more active involvement or interaction between the Sewer District and local industries to determine more accurately the waste flows to the municipal plant and the effect those wastes have on the treatment facility operation. While improving the operation and efficiency of the municipal plant, involvement of the Sewer District in such a program will tend to increase administrative costs. Additionally, pretreatment requirements, equalization of flows, minor process changes, or water conservation measures will tend to increase costs to local industries. These increased costs will be balanced by improved treatment of wastewater flows (hence a water quality benefit), and increased capacity of the treatment system.

Runoff from Development

A. Technical Considerations

1. Existing and Future Conditions

Combined sewage and stormwater overflows in the Sanford system occur at several points. At least ten overflow points have been closed off and are no longer functional. Known points of overflow occur at eight locations, most discharging to the Mousam River.

According to information contained in the recently completed facilities plan for Sanford, only six overflow points are active regularly. Further details on bypasses and overflows in Sanford are presented in the Plan. A sewer system evaluation survey is presently being conducted and should provide additional information on the bypasses and overflows.

The majority of Sanford's sewerage system is combined; however, several areas served by separate stormwater collection systems were identified in a 1966 report on drainage and stormwater separation for the town. Approximately 6.5 miles of storm drains were found, of which 4.75 miles are located in Sanford and 1.75 miles in the Springvale section of town. It was estimated in 1966 that storm drains comprised 14 percent of the total length of sewers in Sanford.

A "Report on Drainage and Storm Water Separation" prepared by Camp, Dresser & McKee (1966) identified drainage areas in the Villages of Sanford and Springvale in great detail. The Springvale area is drained by the Mousam River and Chapman Brook, a tributary of the Mousam River; the Sanford urban area drains to either the Mousam River or to Goodall Brook. Goodall Brook is a tributary to the Great Works River which, in turn, flows to the Salmon Falls River; the latter eventually empties into the Piscataqua River. Numerous areas within the Goodall Brook watershed drains into depressions or kettle holes.

Natural drainage patterns have been modified by urbanization, and a man-made system of combined and separated storm sewers has evolved to serve this urban growth. The latest map of the separated storm sewer system appears in the 1966 report and indicates that Sanford then had 6.5 miles of separated storm sewers. Some additional separation has apparently been accomplished by the Town since the publication of that report. The Sewer District is presently having a detailed sewer system evaluation survey performed which will provide further information on the combined sewer system.

The 1966 drainage report noted numerous drainage problems. In general, the area in Sanford to the west of Main Street was identified as having the most problems (surcharging and backups into persons' homes through sanitary sewer connections). Discussions with personnel of the Sanford Sewer District reveal, however, that Town crews, in recent years, have done a great deal of work in installing separated storm systems and relieving some of the storm drainage problems in those areas.

The estimated volume of runoff from a weekly storm event, which is discharged to streams by separated sewers, plus the uncollected overland runoff from the urban area, which also reaches the streams, and the total associable contaminant loadings of such runoff are given below.

Estimated Flow and Loads from Separate Urban Runoff

Drainage Area (Acres)	Discharge (Million gal. event)	BOD_5 (lbs/ event)	SS (lbs/ event)	N (lbs/ event)	P (lbs/ event)	Fecal Coliform (MPN/event)
Mousam River 1120	5.0	1,500	31,000	150	50	8.9×10^{12}
Goodall Brook 511	2.2	550	12,000	55	19	3.4×10^{12}

The estimated volume of runoff from a weekly storm event discharged by overflows in the combined sewer system with the associable contaminant loadings are:

Estimated Flow and Loads from Combined Sewer Overflows

Drainage Area (Acres)	Discharge (Million gal/ event)	BOD_5 (lbs/ event)	SS (lbs/ event)	N (lbs/ event)	P (lbs/ event)	Fecal Coliform (MPN/event)
Mousam River 243	0.4	380	1,300	36	13	3.0×10^{13}
Goodall Brook 47	0.14	130	470	13	5	1.0×10^{13}

Projected Urban Stormwater Runoff, Per Weekly Storm Event[1]

Year	Discharge MG/Event	BOD_5 (lb/Event)	SS (lb/Event	Fecal Coli. (MPN/Event)	Nitrogen (lb/Event	Phosphorous lb/Event
Area Discharging to Mousam River						
1975	5.0	1,500	31,000	8.9×10^{12}	150	50
1980	6.8	2,300	49,000	1.5×10^{13}	230	77
1985	7.5	2,600	54,000	1.6×10^{13}	260	85
1990	8.7	2,900	61,000	1.8×10^{13}	290	97
1995	9.6	3,300	68,000	2.0×10^{13}	330	108
2000	10.7	3,600	75,000	2.2×10^{13}	360	120
Area Discharging to Goodall Brook						
1975	2.2	550	12,000	3.4×10^{12}	55	13
1980	2.3	770	17,000	4.7×10^{12}	77	26
1985	2.4	810	18,000	4.9×10^{12}	81	28
1990	2.5	840	18,000	5.1×10^{12}	84	28
1995	2.6	860	19,000	5.2×10^{12}	86	29
2000	2.6	880	19,000	5.3×10^{12}	88	30

[1]Assumes complete separation alternative is adopted in the future.

2. Alternatives and Recommendations

No specific urban runoff related problems were identified in the (201) facility planning report. No high priority drainage needs were identified in discussions with town officials. Future drainage work will apparently concentrate on cost-effective combined sewer separation projects which will be detailed in the Town's sewer system evaluation survey.

It appears that complete separation would increase the phosphorous load from 50 lbs/storm event to 77 lbs/storm event (an increase of 4 lbs/day on the average). However, if combined sewer overflows are eliminated by the separation process, an estimated 13 lbs of phosphorous per storm event would be eliminated from discharge to the Mousam River (approximately 2 lbs/day on the average). Thus, it is possible that the costly* program for complete separation and elimination of combined sewer overflows could result in a net increase of 2 lbs of phosphorous/day. Similarly, the net increase of BOD_5 to the Mousam River from the separation-combined sewer overflow elimination project is estimated to be 60/lbs/day. There are, of course, benefits derived from the separation and elimination of combined sewer overflows, most notably the elimination of discharges of untreated wastewater to the Mousam and Goodall Brook which could result in a serious health hazard if not eliminated or treated.

It is suggested that reassessment of separation costs and a cost-effective analysis be developed as a part of a sewer system-evaluation study. The sewer system evaluation survey should provide additional information on the level of separation needed to control overflows.

B. Management Considerations

1. Existing Conditions

The primary responsibility for controlling storm water runoff rests with the municipality. However, where combined sewer systems are under management of a sewer district, responsibilities are shared.

2. Alternatives and Recommendations

Runoff from development can be limited by local codes and ordinances such as subdivision regulations and zoning ordinance performance standards. Additionally, the State Site Location Law requires erosion and sediment control plans for new development. The existing management agencies have adequate authority to control runoff. The Town has the authority to regulate the use of land to limit runoff and the local treatment authority has the power to control collected runoff. Therefore, no institutional changes are recommended. However, to improve controls to limit runoff municipalities are urged to review, modify and adopt the model subdivision regulations and zoning ordinance performance standards included in the Plan.

A technical review team should be funded through federal, state, and local sources, to assist the municipality in establishing ordinances and in the review of proposed developments.

*Estimated cost in the 201 Facilities Plan was $5 million.

C. Impact Assessment

The essential purpose of the recommended ordinances is to minimize the increase of runoff from developed lands, attempting to maintain to the extent possible the natural runoff conditions. This action will tend to eliminate storm related discharges to surface waters and reduce the potential for flooding. Controlling stormwater runoff at the source will decrease the demand for expensive collection and transport facilities.

A secondary impact of the implementation of the ordinances will be increased land development costs.

Also, it has been indicated that complete separation of stormwater will not result in significant water quality improvement; therefore, complete separation is not a cost-effective means for controlling combined sewer overflows.

Runoff from Agriculture

A. Technical Considerations

1. Existing and Future Conditions

The land use/land cover map indicates there are about 30,000 acres in agricultural use in the 208 area (12.9% of the land area). Only 10,000 acres are under intensive farming as cropland, the rest being open pasture or hay fields. The Soil Conservation Service has estimated that 66% of the farms are operated under the guidance of Conservation Plans designed to limit soil loss from the land. Because of this, the erosion and sedimentation problems associated with agricultural land use and the potential water quality impact of runoff from these lands is considered minor for this region.

2. Alternatives and Recommendations

Structural controls to minimize agricultural runoff must be applied on a site specific basis. The Soil Conservation Service's recommended agricultural practices and controls for soil loss developed through Conservation Plans are sufficient to protect water quality in this region. Nonstructural control recommendations are in the Land Use Chapter of the Plan as locally enforced Performance Standards (see Management Considerations below).

B. Management Considerations

1. Existing Conditions

Municipalities have the authority to manage land use controls. The Saco River Corridor Commission manages the land within 1000 feet of the Saco River. Voluntary USDA programs are administered by S.C.S. and A.S.C.S. The federal programs offer technical and financial assistance to farmers to control soil loss.

2. Alternatives and Recommendations

Funding of USDA programs should be continued. Additional money should be channeled into the A.S.C.S. Program and the $2,500 cut-off per project should be raised.

Municipalities should review, revise and adopt appropriate versions of the Model Performance Standards for control of run-off and soil loss. A technical review team should be funded by federal, state, and local sources to assist the municipality in the establishing of ordinances and in the review of proposed developments.

C. Impact Assessment

The essential purpose of the recommended ordinances is to minimize the increase of runoff from agricultural lands attempting to maintain to the extent possible the natural runoff conditions. This action will tend to eliminate storm related discharges to surface waters and reduce the potential for flooding.

A secondary impact of the implementation of these ordinances will be increased costs of agricultural land use.

Salt Storage and Application

A. Technical Considerations

1. Existing and Future Conditions

Salt (sodium chloride) is used in Southern Maine to achieve bare pavement conditions during the winter months. Salt will continue to be used as long as the bare pavement policy is mandated and other highway de-icing chemicals are not used because of their prohibitive cost. Surface water quality problems have not been associated with highway de-icing salt uses. However, a small number of individual water supplies have been found to exceed chloride standards.

2. Alternatives and Recommendations

Since use of highway de-icing salt compounds will continue, general guidelines have been presented for the storage, handling and application of these compounds. These guidelines are sensitive to the conflicting policies of bare pavements in winter and clean water and attempt to strike a balance between the two.

B. Management Considerations

1. Existing Conditions

The State and municipalities have the authority and responsibility to maintain roads and highways in the region. The State has established guidelines and procedures for highway de-icing salt storage and application, and has developed educational and training programs for local operators.

2. Alternatives and Recommendations

Existing Maine laws should be investigated for enforcement powers related to regulate the use of highway de-icing compounds. In the absence of enforceable regulations and state level standards adequate to protection of the environment and compatible with policies related to winter driving conditions, MDEP, MDOT and the other agencies should collaborate on their development. This program development should include a series of checks and balances through required reporting, surveillance and/or sampling, and analysis.

C. Impact Assessment

Continued use of highway de-icing salt for road maintenance in the winter months will present a potential threat to surface and groundwater quality. Following recommended practices for storage and application of the salt will minimize the potential for water quality degradation while maintaining bare pavement policy. These practices may tend to increase the costs of providing facilities for salt storage; however, costs may be partially offset by the resulting conservation of salt.

Runoff from Construction Activities

A. Technical Considerations

1. Existing and Future Conditions

Because of the need to remove the cover vegetation and leave areas exposed during many construction projects, the potential for erosion and sedimentation is great. The soil loss can be extensive and can result in significant degradation of surface water through sedimentation and siltation. Since population projections indicate continued growth and development, construction activities will remain a potential source of water pollution.

2. Alternatives and Recommendations

Since erosion and sedimentation in the study area is principally site specific, each situation or occurrence must be considered in relationship to its own setting. The two major factors to be considered in erosion and sediment control are:

a. Reduction of the raindrop impact energy which reduces its dispersing and eroding power below the critical force and

b. Reduction of the velocity of the surface runoff which, in turn, lessens its abrading power and transporting capacity.

Probably the most effective method of reducing the impact energy of raindrops are those procedures which cover the soil; e.g., natural plant cover, mulching, temporary cover crops and paving or covering with non-erodable materials. If the precipitation falling on the site is not allowed to pick up velocity as it runs off then its erosive power is curtailed. Shortening the length of slope is one of the most effective methods of controlling runoff velocities. This shortening can be accomplished by various techniques such as structural measures, cropping or management patterns, or tillage practices.

It is recommended that the most cost-effective manner of instituting methods for controlling runoff from construction activities is through local land use regulatory controls.

B. Management Considerations

1. Existing Conditions

Construction controls are implemented at all levels. The Federal government imposes controls through the Federal Highway Administration, and the Corps' activities. The State imposes controls through the Site Location Law, the Great Ponds Law, the Wetlands Act, Stream Buildozing, and Mandatory Shoreland Zoning. The Saco River Corridor Commission imposes controls on construction activities. Local controls are imposed through subdivision and zoning regulation.

2. Alternatives and Recommendations

Since the requisite legal authority to regulate construction activities exists, no institutional change is recommended. Municipalities should review, revise, and adopt appropriate versions of the Model Performance Standards for control of runoff and soil loss.

A technical review team should be funded by Federal, State, and local sources to assist the municipality in the establishment of ordinances and in the review of proposed developments.

C. Impact Assessment

The essential purpose of the recommended ordinances is to minimize the increase of runoff from agricultural lands, attempting to maintain to the extent possible the natural runoff conditions. This action will tend to eliminate storm related discharges to surface waters that may adversely affect water quality.

A secondary impact of the implementation of these ordinances could be increased costs for agricultural activities.

Petroleum Storage and Transfer

A. Technical Considerations

1. Existing and Future Conditions

From the evidence there is no question that petroleum products have the potential to contaminate water resources in the SMRPC 208 area. Furthermore, with the potential for more than 31 million gallons of #2 home heating fuel transferred in over 150,000 transactions and with over 16 million gallons of storage capacity within the 208 area, substantial opportunity for similar oil pollution will continue to exist for the foreseeable future. Assuming little change in present technological and other controls, spills and leaks will likely culminate in local long-term environmental degradation with little or no opportunity for corrective action.

Boating activity (specifically exhaust emissions) may not cause major adverse effects on lakes; however, support facilities (e.g., marinas selling oil and fuel and doing repair work), accidents, and negligence in the handling of petroleum products may degrade water quality.

2. Alternatives and Recommendations

This planning effort did not address the large amount of technical control methods for the handling and distribution of petroleum products.

B. Management

1. Existing Conditions

Petroleum storage and transfer are currently managed by Federal, State and local governments. The Federal and State governments primarily regulate water transport, large on-land storage facilities, and discharge to groundwaters and surface waters. Local governments have the authority to control the siting of oil storage facilities adjacent to water bodies.

2. Alternatives and Recommendations

A State level program designed to identify the magnitude of petroleum related pollution should be developed. Applicable controls should be recommended and incorporated into legislative and regulatory programs. Local and regional input should be sought by the State in the design and implementation of the program.

C. Impact Assessment

As long as substantial volumes of petroleum products are handled, stored, transferred and consumed in the SMRPC 208 area, contamination of water resources is likely to continue. Assuming little change in present technological and management controls, spills and leaks will likely culminate in local long-term environmental degradation with little or no opportunity for corrective action. However, a State level program designed to improve the handling of petroleum products will minimize the potential for petroleum related pollution in Maine.

SOUTHERN MAINE REGIONAL PLANNING COMMISSION
AREAWIDE WASTE TREATMENT MANAGEMENT PLAN

IMPACT ASSESSMENT MATRIX SANFORD

LEGEND

- VERY NEGATIVE
- NEGATIVE
- NO IMPACT
- POSITIVE
- VERY POSITIVE

FACTORS IMPACTED

			NATURAL FACTORS																								CULTURAL FACTORS															COST COMPARISON	
			LAND		SURFACE WATERS									GROUNDWATER						AIR				FLORA			FAUNA				LAND USE						Recreation		SOCIAL					ECONOMIC					
		TECHNICAL & MANAGEMENT ALTERNATIVES	SOIL	UNIQUE PHYSICAL FEATURES	DISSOLVED OXYGEN	BIOLOGICAL OXYGEN DEMAND	SUSPENDED SOLIDS	NUTRIENTS	DRINKING WATER SUPPLY	TEMPERATURE	TURBIDITY	BACTERIA & VIRUSES	Toxic Substances & Heavy Metals	CHLORIDES	NITRATES	PHOSPHATES	HEAVY METALS	BATERIA & VIRUSES	DRINKING WATER SUPPLY	PARTICULATES	NITROGEN OXIDES	SULFUR OXIDES	TOXIC SUBSTANCES	NATURAL VEGETATION	MANAGED VEGETATION	AQUATIC VEGETATION	BIRDS	LAND ANIMALS	FISH & SHELLFISH	FOOD CHAINS	Open Space, Wetlands, Forest	AGRICULTURAL	RESIDENTIAL	COMMERCIAL	INDUSTRIAL	FISHING	WATER RECREATION	POPULATION GROWTH	DEVELOPMENT PATTERN	EMPLOYMENT	HEALTH & SAFETY	INSTITUTIONS	WATER SUPPLY	RECREATION	FISHING	MANUFACTURING	CAPITAL COST	Operation/Maintenance Cost
WASTE SOURCES	SEWAGE DISPOSAL COLLECTION & TREATMENT SYSTEMS	Treatment Alternatives: NO ACTION																																														
		Regional Alternatives																																														
		Sewer Extensions: TO ESTES LAKE																																														
		Sewer Extensions: TO BAUNEG BEG POND																																														
		Sewer Extensions: TO SCHOOL STREET																																														
		Management Alternatives: USE EXISTING AUTHORITY																																														
		Management Alternatives: DEVELOP NEW AUTHORITY																																														
	SEWAGE DISPOSAL SUBSURFACE SYSTEMS	Treatment Disposal Systems: SUBSURFACE WASTE DISPOSAL																																														
		Treatment Disposal Systems: ALTERNATIVE TOILETS																																														
		Treatment Disposal Systems: SEWER EXTENSIONS																																														
		Management Alternatives: USE EXISTING AUTHORITY																																														
		Management Alternatives: STRICT CODE ENFORCEMENT																																														
		Management Alternatives: MAINTENANCE PROGRAM																																														
		Management Alternatives: REGIONAL CODE MANAGEMENT																																														
	SEPTAGE DISPOSAL	Disposal Methods: NO ACTION																																														
		Disposal Methods: TREATMENT PLANT																																														
		Disposal Methods: LAND APPLICATION																																														
		Disposal Methods: INCINERATION																																														
		Management Activities: USE EXISTING AUTHORITY																																														
		Management Activities: REGIONALIZATION																																														
	SLUDGE DISPOSAL	Disposal Methods: NO ACTION																																														
		Disposal Methods: LAND APPLICATION																																														
		Disposal Methods: INCINERATION																																														
		Disposal Methods: COMPOSTING																																														
		Management Alternatives: USE EXISTING AUTHORITY																																														
		Management Alternatives: REGIONALIZATION																																														
	SOLID WASTE DISPOSAL	Disposal Methods: NO ACTION																																														
		Disposal Methods: SOURCE SEPARATION																																														
		Disposal Methods: BAILING OR SHREDDING																																														
		Disposal Methods: INCINERATION																																														
		Disposal Methods: INCINERATION WITH HEAT RECOVERY																																														
		Disposal Methods: SANITARY LANDFILL																																														
		Management Alternatives: USE EXISTING AUTHORITY																																														
		Management Alternatives: REGIONALIZATION																																														

KENNEBUNKPORT

WASTE SOURCES ADDRESSED	PRIORITY*
SEWAGE DISPOSAL - COLLECTION AND TREATMENT SYSTEMS	●
SEWAGE DISPOSAL - SUBSURFACE SYSTEMS	⊙
SLUDGE DISPOSAL	⊙
SOLID WASTE DISPOSAL	⊙
SALT STORAGE AND APPLICATION	⊕
RUNOFF FROM CONSTRUCTION ACTIVITIES	⊕
PETROLEUM STORAGE AND TRANSFER	⊕

Sewage Disposal - Collection and Treatment Systems

A. Technical Considerations

1. Existing and Future Conditions

Construction of the existing sewage collection system and treatment plant in Kennebunkport was initiated in 1971. The present system consists of about 3 miles of gravity sewers (8 to 15-inch), 1,800 feet of force main, and 3 pumping stations. The Town does not have a storm sewerage system and the sanitary sewers do not carry storm flows. The present system serves an estimated 300 buildings and a summer population of about 1,900 in the village area east of the Kennebunk River.

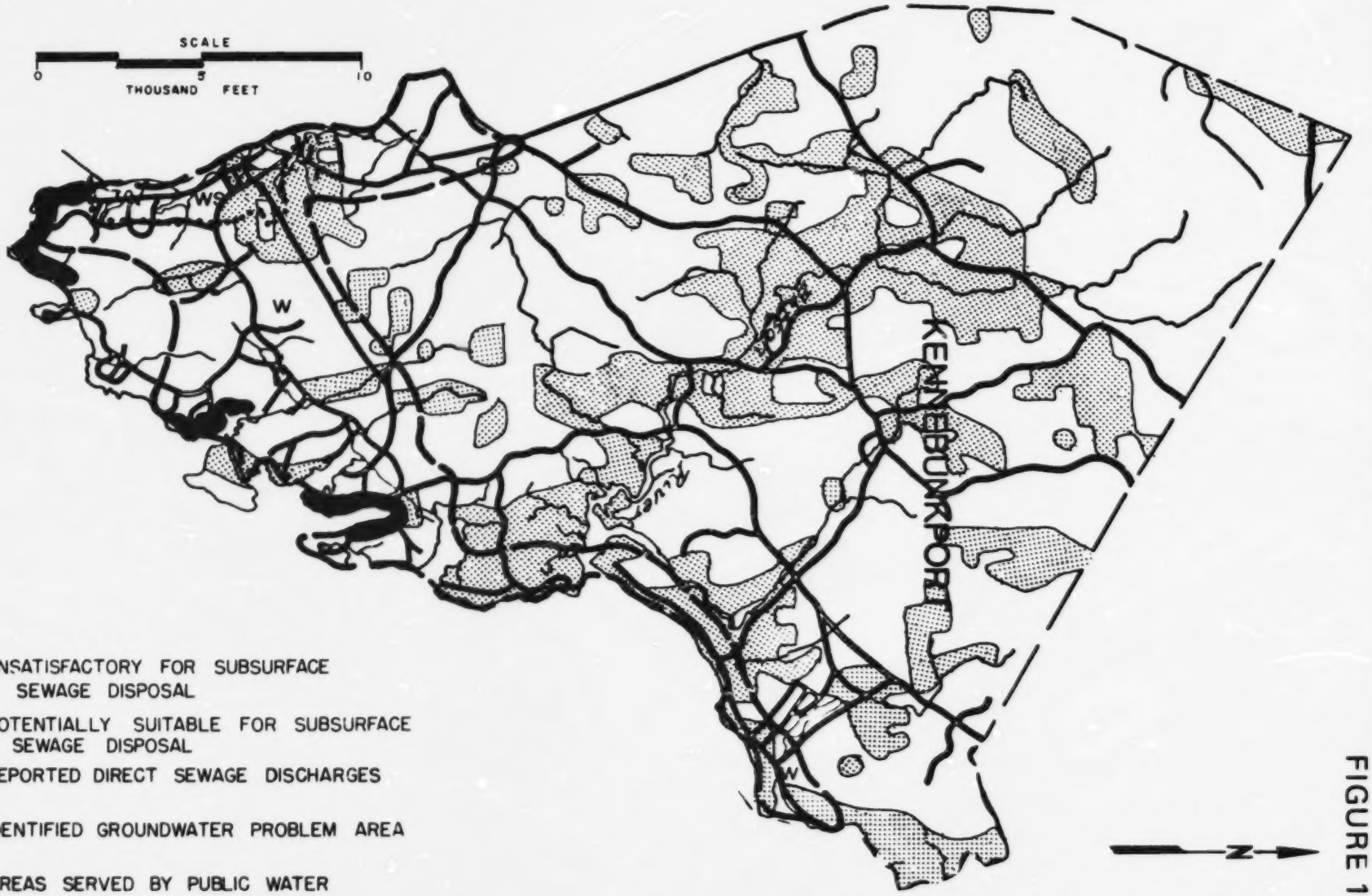
A 1974 comprehensive wastewater report prepared by the Town's engineering consultant recommended expansion of the sewer system in the village, sewering Cape Porpoise and then Goose Rocks Beach areas along the shore. A design contract for a sewer extension to serve the Cape Porpoise area has been approved by the Town of Kennebunkport, while sewers and a sewage treatment plant for the Goose Rocks Beach area are longer range projects.

A principal problem with the present system is hydraulic overloading of lines in the Village--a problem caused by salt water inflow at service connections and laterals on piers in the coastal area along Kings Highway. Repair, replacement, or temporary shut-off of these lines would help to alleviate these problems.

Continued reliance on subsurface disposal systems and direct outfalls to open water, or to other naturally drained areas, provokes a variety of ecological, economic and aesthetic impacts which are correctable. The inadequacy of those disposal systems (e.g., septic tank failures at Goose Rocks Beach, Cape Porpoise, Turbats Creek, and Cape Arundel) to meet both current water quality standards (in commercial shellfish areas for example) and anticipated growth in the Town has prompted consideration of expansion of the present sewerage system to areas now unsewered.

*● HIGH PRIORITY ⊙ PRIORITY ⊕ LOW PRIORITY

GENERAL SOIL SUITABILITY FOR WASTE DISPOSAL



UNSATISFACTORY FOR SUBSURFACE SEWAGE DISPOSAL

POTENTIALLY SUITABLE FOR SUBSURFACE SEWAGE DISPOSAL

REPORTED DIRECT SEWAGE DISCHARGES

IDENTIFIED GROUNDWATER PROBLEM AREA

W — AREAS SERVED BY PUBLIC WATER

S — AREAS SERVED BY PUBLIC SEWERS

FIGURE 12

Kennebunkport's secondary wastewater treatment plant, licensed by NPDES permit No. ME01000048, Maine waste discharge licence No. 683, employs the contact stabilization process during the summer and the extended aeration treatment process during the remainder of the year. The plant has been operational since 1972; unit operations and processes include: influent pumping, comminution, aeration, final clarification, and chlorination. The effluent is discharged to the Kennebunk River, a class SB-2 waterway at that point.

The plant is designed to treat an average flow of 0.25 mgd; the present average daily flow is about 0.15 mgd, peak daily flows have reached as high as 0.49 mgd. There are no major industrial users but approximately 200,000 gallons of septage is treated annually. The plant complies with its permit discharge limitations of 30 mg/l BOD with an 85% removal efficiency, 30 mg/l total suspended solids with an 85% removal efficiency, and 15 coliform colonies per 100 ml of effluent.

Kennebunkport's facility is one of two facilities presently discharging treated wastewater to the Kennebunk River estuary. The outfall from the new secondary treatment plant serving the sewered area of Kennebunkport is located about 800 feet south of the Route 9 bridge. Kennebunk operates two primary treatment facilities, only one of which is in the Kennebunk River basin. That plant, the Boothbay Road plant, discharges to the Kennebunk River indirectly via an outfall to Gooch's Brook, which then flows eastward to the Kennebunk tidewaters.

The Kennebunk River's estuary has a high population of clams but bacterial pollution has been responsible for closing these waters to shellfish harvesting. Discharge from Kennebunkport's municipal treatment plant is within the estuary. But, except for occasional hydraulic overloadings of the collection systems the efficiency of Kennebunkport's treatment processes--particularly the disinfection of bacterial pollutants--is quite high and it therefore seems unlikely that the effluent from that plant is responsible for bacterial loadings of the Kennebunk River downstream from the plant's outfall.

On the Town of Kennebunk's side of the river, however, is a primary treatment plant which discharges to Gooch Creek, a tributary on the western side of the river. There have been operational problems with this plant and it has been proposed that it be phased out when new facilities are constructed in Kennebunk. Until that time this primary plant will probably continue as a source of incompletely treated wastewater which pollutes the estuary of the Kennebunk River.

2. Alternatives and Recommendations

Expansion of the collection system to serve residents in Cape Porpoise Harbor and Turbats Creek appears to be the highest priority. The Town's engineers are presently investigating alternative routes to convey wastewater from Cape Porpoise. One route, along Turbats Creek would disturb a marsh. The other route, along Wildes District Road reportedly would involve excavation into ledge and require two additional pumping stations. Estimated cost to serve the areas is $2.16 million. Sewering these areas would relieve the water pollution problem caused by malfunctioning septic tank systems and direct discharges and hopefully would allow re-opening of the clam flats.

The plant experiences periodic "washouts" due to salt water inflow to the sewerage system during very high tide; EPA has recommended that the wastewater collection be repaired (broken lines on piers). Another problem concerns sludge handling and disposal. The sand drying beds can be used only during the summer. Sludge must be stored in the aerobic digester in aeration tanks during the winter causing a carry over of solids in the plant effluent. EPA has recommended periodic wasting of the sludge to a state-approved disposal area during the winter to minimize the solids washout problem.

Modifications to the existing treatment system have been recommended by the Town's consulting engineers. Changes to the existing treatment plant include expansion in two stages to 1.1 mgd with a first phase capacity of 0.50 mgd. Contact stabilization would be used as a treatment process during the summer while conventional activated sludge would be used during the winter. Unit processes and operations in the proposed expanded village treatment plant would include fine rotating screens, aeration, final clarification, chlorination, aerobic sludge digestion, and dewatering of sludge by gravity filter. The Goose Rocks Beach area would be served by a proposed treatment plant of .35 mgd capacity with the capability of being expanded to .75 mgd. Extended aeration would be used as the treatment process during the winter while the contact stabilization process would be used to provide secondary treatment during the summer. Unit processes and operations would include comminution, aeration, final sedimentation, chlorination, underdrained sand beds (for tertiary treatment), and aerobic sludge digesters. The sludge would be dewatered at the village treatment plant. The effluent would be discharged to the tidal marshes of Smith Brook which discharges to Goosefare Bay.

The Town's highest priority is to expand the existing 0.75 mgd secondary treatment facility since by 1980 the hydraulic capacity of the plant may be exceeded by the increased sewage flows. The sewering of the Goose Rocks Beach area should be considered a lower priority.

The 1974 report concluded that "Due to the large distance separating that portion of Goose Rocks Beach..., which presently requires sewers, from Kennebunkport Village...and, Cape Porpoise..., it is most economical to treat the wastewater from Goose Rocks Beach at a new wastewater treatment plant..." Our analysis of the sewerage needs of the Saco coastal, Biddeford Pool and Goose Rocks Beach areas concludes that it would not be economical to treat sewage from Goose Rocks Beach with that from the Biddeford Pool or Saco coastal areas, supporting the recommended separate treatment facility for Goose Rocks Beach if a centralized collection and treatment system were constructed.

Only within the last year or two has the U.S. Environmental Protection Agency encouraged the consideration of smaller, decentralized sewage treatment systems. One alternative that may be suitable for the Goose Rocks Beach area is the septic tank-sand filter chlorination system. Effluent from a septic tank is conveyed to a sand filter from additional BOD and suspended solids removal and is then disinfected, usually by dry chlorine compounds, before discharging to a watercourse. With proper operation and maintenance the system can consistently produce an effluent meeting federal discharge permit limitations. One system can serve several homes and only systems that do serve more than one home are eligible for federal construction grants. The system does have

disadvantages; operating and maintaining hundreds of individual systems is much more difficult than operating and maintaining one central system. In addition an NPDES discharge permit would have to be obtained for each outfall. However, considering the high cost of constructing and operating a tertiary treatment facility, alternate, small scale facilities should be considered before proceeding with the design of a conventional, centralized collection and treatment system.

B. Management Considerations

1. Existing Conditions

The Town owns and operates the wastewater collection and treatment system in the Town of Kennebunkport.

2. Alternatives and Recommendations

The following management methods were considered and discussed in the management section of the 208 plan.

a. One single regional sewer district
b. County management of all facilities
c. Management by watershed
d. Management by sewer district for each population center
e. No change in the institutional arrangements

Although a single regional sewer district, county management, or other areawide/regional management agency would tend to reduce overall administrative costs and improve consistency in the provision of collection and treatment services, the establishment of such new agencies requires extensive, new legislative and institutional frameworks. Consequently implementation of a new authority may require a long period of time. Also, individual towns would have a reduced ability for self-determination regarding a town's desires for municipal services and population growth.

The analysis of these potential management agencies resulted in the conclusion that the existing cities, towns, and sewer districts have the authority to design, construct, and manage wastewater collection and treatment facilities. In addition, by minimizing institutional changes, the existing agencies and officials that have participated in the development of the Plan will likewise participate in the immediate implementation of the Plan. Therefore, existing management agencies should continue to design, construct, and manage wastewater collection and treatment systems.

C. Impact Assessment

The high priority recommendations for Kennebunkport are to increase the capacity of the waste treatment facility and extend sewer service to the Cape Porpoise Harbor and Turbats Creek. The impact of extending the sewage collection system to Cape Porpoise Harbor and Turbat's Creek areas will be substantially improved water quality in the Harbor and the Creek while increasing the discharge of treated wastewater to the Kennebunk River. The odors problem associated with direct discharges to the Harbor will be eliminated, improving recreational opportunities. In addition to these benefits, the elimination of the direct sewage discharges to these areas will improve the shellfishing and fishing in the area.

Rather than extend sewers to Goose Rocks it is recommended that a separate treatment facility be provided. This treatment system may take the form of individual and/or community septic tank - sand filter chlorination system. Alternatives developed for Kennebunkport are presented in detail in the plan. These alternatives are assessed for their impact in a qualitative manner utilizing a summary matrix. This matrix presents the major proposals for Kennebunkport's system and relates these to the natural and cultural factors that may be impacted through primary or secondary effects of the proposed facilities.

Sewage Disposal - Subsurface Systems

A. Technical Considerations

1. Existing and Future Conditions

The Kennebunkport coastal area is bounded on the north by the mouth of the Little River and by the estuary of the Kennebunk River on the south. Except for the Little River estuary,the Cape Porpoise area's tidewaters, the Batson River estuary, and the head of the Kennebunk River's estuary this stretch of coastal waters is classified by Maine's DEP as SB-2 or better. Such classification presumes that shellfish harvesting and water-contact recreation shall be allowed. However, only one major shellfish area in Kennebunkport remains open and that is along the Goosefare Bay Beach area (i.e. the Goose Rocks area).

Failure to meet the DEP's classification for water quality levels permitting shellfishing in many of these coastal areas can be traced to failure, seepage, or direct discharge from on-site disposal systems; this is particularly true in the Cape Porpoise Harbor and Turbat's Creek areas. Here, in addition to the seepage problem from septic tanks, the problem is complicated by the absence of tidal streams or rivers to continually flush out the accumulating pollutants in the bays and harbors. Tidal flushing alone is sufficient to purify these idented coastal areas.

A collection system and treatment plant in the Goose Rocks area has been proposed to alleviate this type of problem in the unsewered coastal areas of the Town.

2. Alternatives and Recommendations

Subsurface sewage disposal must remain as the major treatment and disposal method for domestic sewage wastes for rural or unsewered areas in the 208 region (cost of public sewers in these areas is prohibitive). Where problems have been defined, sewer service has been evaluated as an alternative to subsurface sewage disposal systems (see Sewage Disposal - Collection and Treatment Systems). Additionally, alternative toilet systems may be used to reduce the potential impact of sewage wastes on soils and groundwater.

In order to minimize future extensions of the wastewater collection system in the future, the Town should consider adopting Appendix 1 of the State Plumbing Code (which provides guidelines for minimum lot sizes where on-site systems are used--this is not a regulation as part of the zoning ordinance.

B. Management Considerations

1. Existing Conditions

Each town presently regulates subsurface waste disposal in accordance with the State Plumbing Code. Each town has its own Local Plumbing Inspector (usually part-time) who is responsible for issuing permits and enforcing the Code. Soils analysis is done by State certified soil investigators. They submit soils reports to the Plumbing Inspector and the State Department of Human Services. Maintenance is the individual's responsibility; however, there is no legal requirement for maintenance or inspection of systems after installation.

Malfunctioning sewage disposal systems are declared by law to be a nuisance and must be abated upon order by the municipality.

2. Alternatives and Recommendations

The Maine State Plumbing Code is protective of the environment through proper design and installation of subsurface sewage disposal systems. Alternatives considered to improve the effectiveness of the Code include improved State and local enforcement, mandatory maintenance and inspection, and regionalization of inspection and enforcement programs.

There should be stricter enforcement of the Plumbing Code. This can best be achieved by employment of a full-time, well qualified inspector hired to serve one or more towns. Maintenance should be required by the State and enforced through a local or regional inspection program. A funding program for rehabilitating systems should be investigated, utilizing EPA, Farmers Home Administration, Community Services Administration, and local banks as sources.

C. Impact Assessment

The major issue associated with this waste source is the increased local cost to implement an improved enforcement and inspection program related to the Plumbing Code. This moderate increase in cost will be balanced by improved reliability of subsurface sewage disposal resulting in improved water quality, health, and safety. Kennebunkport paid $1,900 in salary for a code enforcement officer in 1976. A regional code enforcement program shared with Kennebunk would cost an estimated $5,255 per year. This cost for maintenance and enforcement of the Plumbing Code could save potential investments in expensive sewage facilities by assuring the reliability and effectiveness of subsurface disposal.

A secondary impact of this action will affect the homeowners with malfunctioning septic systems. Mandatory rehabilitation is expected to cost the homeowner of a malfunctioning system from $20 for pumping to $2,000 for replacement.

Sludge Disposal

A. Technical Considerations

1. Existing and Future Conditions

The Kennebunkport Waste Treatment Plant is presently generating approximately 20 cubic yards of sludge annually. The sludge is stabilized by

aerobic digestion and dewatered on sand drying beds for approximately 15 days. The sludge is then dry enough to facilitate handling by Kennebunkport residents who use it as a soil conditioner. Sludge may be picked up at either the waste treatment plant or the town's solid waste disposal area where it is temporarily stored.

In the future additional areas in Kennebunkport may be served by public sewerage. The resulting plant changes may cause the production of a relatively wet sludge. Wet sludge is less desirable for use as a soil conditioner.

It is anticipated that in the year 2000 sixty percent of Kennebunkport's projected permanent population of 4,400 people will be served by municipal sewerage. It is estimated that a similar percentage of the projected 3,500 seasonal residents will also be served by sewerage. This would result in an equivalent annual population of 3,500 which would be served by sewerage. It is estimated that the sludge generated from this system will be 270 cubic yards per year with a sixty percent moisture content.

The Town has reportedly considered burying the sludge at the Kennebunkport solid waste disposal site. The disposal site is located on the east side of Beechwood Road approximately two miles from the community center. SCS Medium Intensity Soils Mapping indicates that the site is situated in Hollis very rocky fine sandy loan with a general slope of 3-8%. The Maine Guidelines designated this soil as unsuitable for both land application and burying of sludge.

Topographical maps indicate that surface and subsurface drainage probably flow to the south and southeast. Tyler Brook is located in the probable drainage path approximately 750 feet from the site.

Since most of the site is characterized by shallow to bedrock conditions, there is a potential for runoff flow into Tyler Brook. Scattered homes are located on Beechwood Road approximately 500 feet west of the closest point. It is unlikely that the groundwater to the west of the site would be significantly affected by the proposed sludge disposal since the direction of flow is probably in southerly and southeasterly directions, following the surface topography.

Scattered homes with private wells are located in the probable direction of drainage approximately one mile east of the site. Tyler Brook and one of its tributaries, is situated between these homes and the disposal site.

2. Alternatives and Recommendations

The Plan has reviewed a number of technical alternatives including incineration, composting, and land disposal.

Composting is a potential sludge disposal method in which the town is interested. This alternative should be considered further due to the apparent scarcity of suitable land application sites in Kennebunkport.

Should the Saco sludge incinerator be constructed, sludge from Kennebunkport could be transported there for disposal. This alternative is discussed further in the Saco sludge disposal portion of the Plan.

B. Management Considerations

1. Existing Conditions

The municipality is responsible for providing an approved sludge disposal site and operating the site in accordance with state regulations for land disposal of sludge. The state regulates the location of the site, application, loading rates, and maintenance of the site, to protect the health of the community, and to prevent drinking water contamination.

2. Alternatives and Recommendations

The existing management agencies have the requisite authority to properly carry out the task of sludge disposal. No management changes are recommended. However, thorough, uniform enforcement of state regulations should be pursued.

C. Impact Assessment

The general recommendation stated above is to undertake a detailed feasibility study for the anticipated sludge to be generated by the new secondary treatment facility. Applicable disposal alternatives have been identified and assessed in general in the Plan. A more detailed impact assessment will be required once the feasibility study develops a specific recommendation. The alternatives are assessed in a qualitative manner in the Impact Assessment Matrix. This can serve as a guide for the municipality in evaluating the alternatives.

Solid Waste Disposal

A. Technical Considerations

1. Existing and Future Conditions

The disposal area for Kennebunkport is located on the Beechwood Road about two miles from the center of town. The site has been operated as a burning dump for over 35 years. Kennebunkport has recently purchased a crawler loader, however, and will compact and cover the refuse next spring. Until then, burning has been restricted to one day per week. Operating as a landfill, the site has sufficient capacity for 6-8 years assuming a generation rate of 3.5 pounds per capita per day, or 1800 tons per year.

Soils around the site are glacial till derived with shallow to bedrock conditions. Bedrock is often exposed. These soils have a high water table and water is visible on the surface on the northern and southern sides of the fill area. These soils are not recommended for landfill. Tyler Brook is approximately 750 feet to the south and east of the dump, and groundwater apparently migrates in the direction of this stream. One or two residences may be within 1000 feet of the site, but are probably upstream of the groundwater flow. With a proper closing of the site, groundwater problems can be minimized.

2. Alternatives and Recommendations

A new disposal facility will be required within the planning period.

The alternatives discussed in the Plan include: sanitary landfill, baling and shredding, incineration, and incineration with heat recovery. Regional disposal systems have also been evaluated for Kennebunk, Arundel, Kennebunkport, and Wells. Costs have been compared on an individual town basis and with the towns together as a region.

ESTIMATED ANNUAL SOLID WASTE DISPOSAL COSTS - ALTERNATIVES

	Annual Generation	Sanitary Landfill	Baling or Shredding	Incineration	Incineration with Heat Recovery
The Region	18,300	$109,800 $6/T	$164,700 $9/T	$292,800 $16/T	$160,125 $8.75/T

Annual generation of solid waste in the Wells-Kennebunk-Kennebunkport-Arundel region is 18,300 tons. Landfill is probably the only acceptable disposal option viable in the region. A regional landfill would cost $6 per ton.

The number of suitable landfill sites in the region is not great, most of these sites would require a great amount of modification to be environmentally acceptable. This becomes cost effective only with large disposal volumes. The estimated costs of operating individual and regional landfills is shown below. Although regional landfill is the most cost effective disposal method available for the towns within the region, transportation costs for most of the towns will increase. This added cost will not be great, however, and will not necessitate the use of transfer stations for transport within the region.

ESTIMATED ANNUAL SOLID WASTE DISPOSAL COSTS - INDIVIDUAL VERSUS REGIONAL

Municipality	Annual Generation	Sanitary Landfill
Arundel	1,900	$13/T
Kennebunk	7,000	$8.50/T
Kennebunkport	2,800	$11/T
Wells	6,600	$9/T
Region	18,300	$6/T

B. Management Considerations

1. Existing Conditions

The municipality of Kennebunkport owns and operates a solid waste disposal site.

2. Alternatives and Recommendations

Kennebunkport has the option of continuing to own and operate their disposal facility or joining a regional disposal system. A regional disposal district may be established by a special district or interlocal agreement. The cost estimates for waste disposal support selection of the regional system.

C. Impact Assessment

In general, the alternative processing and disposal methods investigated in the plan primarily impact air and water quality. Sanitary landfills, regardless of the solid waste processing method selected, can impact water quality (groundwater and surface water) through generation of leachate. Incineration as a processing method reduces water quality impact while generating potential air quality impacts. Incineration with heat recovery has the same environmental impacts as standard incineration but reduces the economic impact (high cost of incineration) through revenues from sale of steam. Baling and shredding do not reduce water quality impact from leachate, but rather may provide economic benefit through increased landfill life. Source separation provides benefits through reduction of waste that must be disposed. These impacts are summarized in the Impact Assessment Matrix.

Salt Storage and Application

A. Technical Considerations

1. Existing and Future Conditions

Salt (sodium chloride) is used in Southern Maine to achieve bare pavement conditions during the winter months. Salt will continue to be used as long as the bare pavement policy is mandated and other highway de-icing chemicals are not used because of their prohibitive cost. Surface water quality problems have not been associated with highway de-icing salt uses. However, a small number of individual water supplies have been found to exceed chloride standards.

2. Alternatives and Recommendations

Since use of highway de-icing salt compounds will continue, general guidelines have been presented for the storage, handling and application of these compounds. These guidelines are sensitive to the conflicting policies of bare pavements in winter and clean water and attempt to strike a balance between the two.

B. Management Considerations

1. Existing Conditions

The State and municipalities have the authority and responsibility to maintain roads and highways in the region. The State has established guidelines and procedures for highway de-icing salt storage and application, and has developed educational and training programs for local operators.

2. Alternatives and Recommendations

Existing Maine laws should be investigated for enforcement powers related to regulate the use of highway de-icing compounds. In the absence of enforceable regulations and state level standards adequate to protection of the environment and compatible with policies related to winter driving conditions, MDEP, MDOT and the other agencies should collaborate on their development. This program development should include a series of checks and balances through required reporting, surveillance and/or sampling, and analysis.

C. Impact Assessment

Continued use of highway de-icing salt for road maintenance in the winter months will present a potential threat to surface and groundwater quality. Following recommended practices for storage and application of the salt will minimize the potential for water quality degradation while maintaining bare pavement policy. These practices may tend to increase the costs of providing facilities for salt storage, however, costs may be partially offset by the resulting conservation of salt.

Runoff from Construction Activities

A. Technical Considerations

1. Existing and Future Conditions

Because of the need to remove the cover vegetation and leave areas exposed during many construction projects, the potential for erosion and sedimentation is great. The soil loss can be extensive and can result in significant degradation of surface water through sedimentation and siltation. Since population projections indicate continued growth and development, construction activities will remain a potential source of water pollution.

2. Alternatives and Recommendations

Since erosion and sedimentation in the study area is principally site specific, each situation or occurrence must be considered in relationship to its own setting. The two major factors to be considered in erosion and sediment control are:

a. Reduction of the raindrop impact energy which reduces its dispersing and eroding power below the critical force and

b. Reduction of the velocity of the surface runoff which, in turn, lessens its abrading power and transporting capacity.

Probably the most effective method of reducing the impact energy of raindrops are those procedures which cover the soil; e.g., natural plant cover, mulching, temporary cover crops and paving or covering with non-erodable materials. If the precipitation falling on the site is now allowed to pick up velocity as it runs off then its erosive power is curtailed. Shortening the length of slope is one of the most effective methods of controlling runoff velocities. This shortening can be accomplished by various techniques such as structural measures, cropping or management patterns, or tillage practices.

It is recommended that the most cost-effective manner of instituting methods for controlling runoff from construction activities is through local land use regulatory controls.

B. Management Considerations

1. Existing Conditions

Construction controls are implemented at all levels. The Federal government imposes controls through the Federal Highway Administration,

and the Corps' activities. The State imposes controls through the Site Location Law, the Great Ponds Law, the Wetlands Act, Stream Bulldozing, and Mandatory Shoreland Zoning. The Saco River Corridor Commission imposes controls on construction activities. Local controls are imposed through subdivision and zoning regulation.

2. Alternatives and Recommendations

Since the requisite legal authority to regulate construction activities exists, no institutional change is recommended. Municipalities should review, revise, and adopt appropriate versions of the Model Performance Standards for control of runoff and soil loss.

A technical review team should be funded by Federal, State, and local sources to assist the municipality in the establishment of ordinances and in the review of proposed developments.

C. Impact Assessment

The essential purpose of the recommended ordinances is to minimize the increase of runoff from agricultural lands, attempting to maintain to the extent possible the natural runoff conditions. This action will tend to eliminate storm related discharges to surface waters that may adversely affect water quality.

A secondary impact of the implementation of these ordinances could be increased costs for agricultural activities.

Petroleum Storage and Transfer

A. Technical Considerations

1. Existing and Future Conditions

From the evidence there is no question that petroleum products have the potential to contaminate water resources in the SMRPC 208 area. Furthermore, with the potential for more than 31 million gallons of #2 home heating fuel transferred in over 150,000 transactions and with over 16 million gallons of storage capacity within the 208 area, substantial opportunity for similar oil pollution will continue to exist for the foreseeable future. Assuming little change in present technological and other controls, spills and leaks will likely culminate in local long-term environmental degradation with little or no opportunity for corrective action.

Boating activity (specifically exhaust emissions) may not cause major adverse effects on lakes; however, support facilities (e.g., marinas selling oil and fuel and doing repair work), accidents, and negligence in the handling of petroleum products may degrade water quality.

2. Alternatives and Recommendations

This planning effort did not address the large amount of technical control methods for the handling and distribution of petroleum products.

B. Management Considerations

1. Existing Conditions

Petroleum storage and transfer are currently managed by Federal, State and local governments. The Federal and State governments primarily regulate water transport, large on-land storage facilities, and discharge to groundwaters and surface waters. Local governments have the authority to control the siting of oil storage facilities adjacent to water bodies.

2. Alternatives and Recommendations

A State level program designed to identify the magnitude of petroleum related pollution should be developed. Applicable controls should be recommended and incorporated into legislative and regulatory programs. Local and regional input should be sought by the State in the design and implementation of the program.

C. Impact Assessment

As long as substantial volumes of petroleum products are handled, stored, transferred and consumed in the SMRPC 208 area, contamination of water resources is likely to continue. Assuming little change in present technological and management controls, spills and leaks will likely culminate in local long-term environmental degradation with little or no opportunity for corrective action. However, a state level program designed to improve the handling of petroleum products will minimize the potential for petroleum related pollution in Maine.

SOUTHERN MAINE REGIONAL PLANNING COMMISSION
AREAWIDE WASTE TREATMENT MANAGEMENT PLAN

IMPACT ASSESSMENT MATRIX KENNEBUNKPORT

LEGEND

- VERY NEGATIVE
- NEGATIVE
- NO IMPACT
- POSITIVE
- VERY POSITIVE

FACTORS IMPACTED

			NATURAL FACTORS																						CULTURAL FACTORS														COST COMPARISON	
			LAND		SURFACE WATERS									GROUNDWATER						AIR				FLORA			FAUNA				LAND USE					Recreation		SOCIAL					ECONOMIC					
		TECHNICAL & MANAGEMENT ALTERNATIVES	SOIL	UNIQUE PHYSICAL FEATURES	DISSOLVED OXYGEN	BIOLOGICAL OXYGEN DEMAND	SUSPENDED SOLIDS	NUTRIENTS	DRINKING WATER SUPPLY	TEMPERATURE	TURBIDITY	BACTERIA & VIRUSES	Toxic Substances & Heavy Metals	CHLORIDES	NITRATES	PHOSPHATES	HEAVY METALS	BATERIA & VIRUSES	DRINKING WATER SUPPLY	PARTICULATES	NITROGEN OXIDES	SULFUR OXIDES	TOXIC SUBSTANCES	NATURAL VEGETATION	MANAGED VEGETATION	AQUATIC VEGETATION	BIRDS	LAND ANIMALS	FISH & SHELLFISH	FOOD CHAINS	Open Space, Wetlands, Forest	AGRICULTURAL	RESIDENTIAL	COMMERCIAL	INDUSTRIAL	FISHING	WATER RECREATION	POPULATION GROWTH	DEVELOPMENT PATTERN	EMPLOYMENT	HEALTH & SAFETY	INSTITUTIONS	WATER SUPPLY	RECREATION	FISHING	MANUFACTURING	CAPITAL COST	Operation/Maintenance Cost
WASTE SOURCES	SEWAGE DISPOSAL COLLECTION & TREATMENT SYSTEMS	Treatment Alternatives: NO ACTION			■	■	■	■				■	■															■	■																			
		Treatment Alternatives: EXPAND EXISTING SECONDARY FACILITY																															■	■				■	■								■	■
		Treatment Alternatives: CENTRALIZED TREATMENT, GOOSEROCKS BEACH													■	■		■										■	■					■	■			■	■								■	■
		Treatment Alternatives: DECENTRALIZED TREATMENT, GOOSEROCKS BEACH																																														
		Regional Alternatives: GOOSEROCKS BEACH TO KENNEBUNKPORT STP													■	■		■										■	■					■	■			■	■								■	■
		Regional Alternatives: GOOSEROCKS BEACH TO NEW BIDDEFORD POOL FACILITY																																														
		Sewer Extensions: TO CAPE PORPOISE			■	■	■	■			■	■			■	■		■										■	■				■	■	■		■	■	■						■	■	■	■
		Sewer Extensions: TO TURBATS CREEK			■	■	■	■			■	■			■	■		■										■	■				■	■	■		■	■	■						■	■	■	■
		Management Alternatives: USE EXISTING AUTHORITY																																								■						
		Management Alternatives: DEVELOP NEW AUTHORITY																																														
	SEWAGE DISPOSAL SUBSURFACE SYSTEMS	Treatment Disposal Systems: SUBSURFACE WASTE DISPOSAL																■	■														■	■			■	■			■							
		Treatment Disposal Systems: ALTERNATIVE TOILETS													■	■		■	■						■								■	■				■											
		Treatment Disposal Systems: SEWER EXTENSIONS													■	■		■	■														■	■	■			■	■	■		■				■	■	■	■
		Management Alternatives: USE EXISTING AUTHORITY																																														
		Management Alternatives: STRICT CODE ENFORCEMENT													■	■		■	■												■					■	■			■										
		Management Alternatives: MAINTENANCE PROGRAM													■	■		■	■																	■	■													
		Management Alternatives: REGIONAL CODE MANAGEMENT																																														■
	SEPTAGE DISPOSAL	Disposal Methods: NO ACTION																																														
		Disposal Methods: TREATMENT PLANT																																														
		Disposal Methods: LAND APPLICATION																																														
		Disposal Methods: INCINERATION																																														
		Management Activities: USE EXISTING AUTHORITY																																														
		Management Activities: REGIONALIZATION																																														
	SLUDGE DISPOSAL	Disposal Methods: NO ACTION	■												■			■																							■							
		Disposal Methods: LAND APPLICATION																																														
		Disposal Methods: INCINERATION	■												■			■																														■	■
		Disposal Methods: COMPOSTING	■																						■																							
		Management Alternatives: USE EXISTING AUTHORITY																																														
		Management Alternatives: REGIONALIZATION																																														■
	SOLID WASTE DISPOSAL	Disposal Methods: NO ACTION	■		■	■	■	■			■	■			■	■	■	■												■																		
		Disposal Methods: SOURCE SEPARATION	■		■	■	■	■			■	■			■	■	■	■												■									■								■	■
		Disposal Methods: BAILING OR SHREDDING																																														
		Disposal Methods: INCINERATION	■		■	■	■	■			■	■			■	■	■	■												■																		■	■
		Disposal Methods: INCINERATION WITH HEAT RECOVERY	■		■	■	■	■			■	■			■	■	■	■												■																		■	■
		Disposal Methods: SANITARY LANDFILL																																														
		Management Alternatives: USE EXISTING AUTHORITY																																														■
		Management Alternatives: REGIONALIZATION																																														■

KENNEBUNK

WASTE SOURCES ADDRESSED	PRIORITY*
SEWAGE DISPOSAL - COLLECTION AND TREATMENT SYSTEMS	●
SEWAGE DISPOSAL - SUBSURFACE SYSTEMS	◉
SLUDGE DISPOSAL	◉
SOLID WASTE DISPOSAL	⊕
INDUSTRIAL WASTE DISPOSAL	⊕
RUNOFF FROM DEVELOPMENT	⊕
RUNOFF FROM AGRICULTURE	⊕
SALT STORAGE AND APPLICATION	⊕
RUNOFF FROM CONSTRUCTION ACTIVITIES	⊕
PETROLEUM STORAGE AND TRANSFER	⊕

Sewage Disposal - Collection and Treatment Systems

A. Technical Considerations

1. Existing and Future Conditions

Two areas in Kennebunk, the Village and the beach areas, are served by wastewater collection systems. There are about 13.5 miles of separated sanitary sewers and 3 miles of combined sewers in Kennebunk Village. The beach area is served by approximately 5.5 miles of separate sanitary sewers, although 5 catch basins are reportedly connected to the system. Two primary treatment plants, one on Water Street in the Village and the other off Boothby Road in the beach area, presently handle wastewater from the respective collection systems. Some of the sewers in Kennebunk were constructed around 1900 and major additions to the system were made in the early 1960's.

The primary problems in existing sewerage systems relate to excessive infiltration and inflow. As a result, flows at both treatment plants increase greatly following rainfall events and overflows occur at points upstream in the system. In Kennebunk Village, rehabilitation of sewers has been recommended by the 201 consultant in several areas to reduce wastewater flows.

At times during field studies of infiltration/inflow, the 201 consultant found some of the sewers, especially in the beach area, to be heavily deposited with sediment. Much of this solid matter is introduced with urban runoff. As catch basins are separated from the sanitary sewerage system, the solids loading as well as inflow to sewers should be reduced.

*● HIGH PRIORITY ◉ PRIORITY ⊕ LOW PRIORITY

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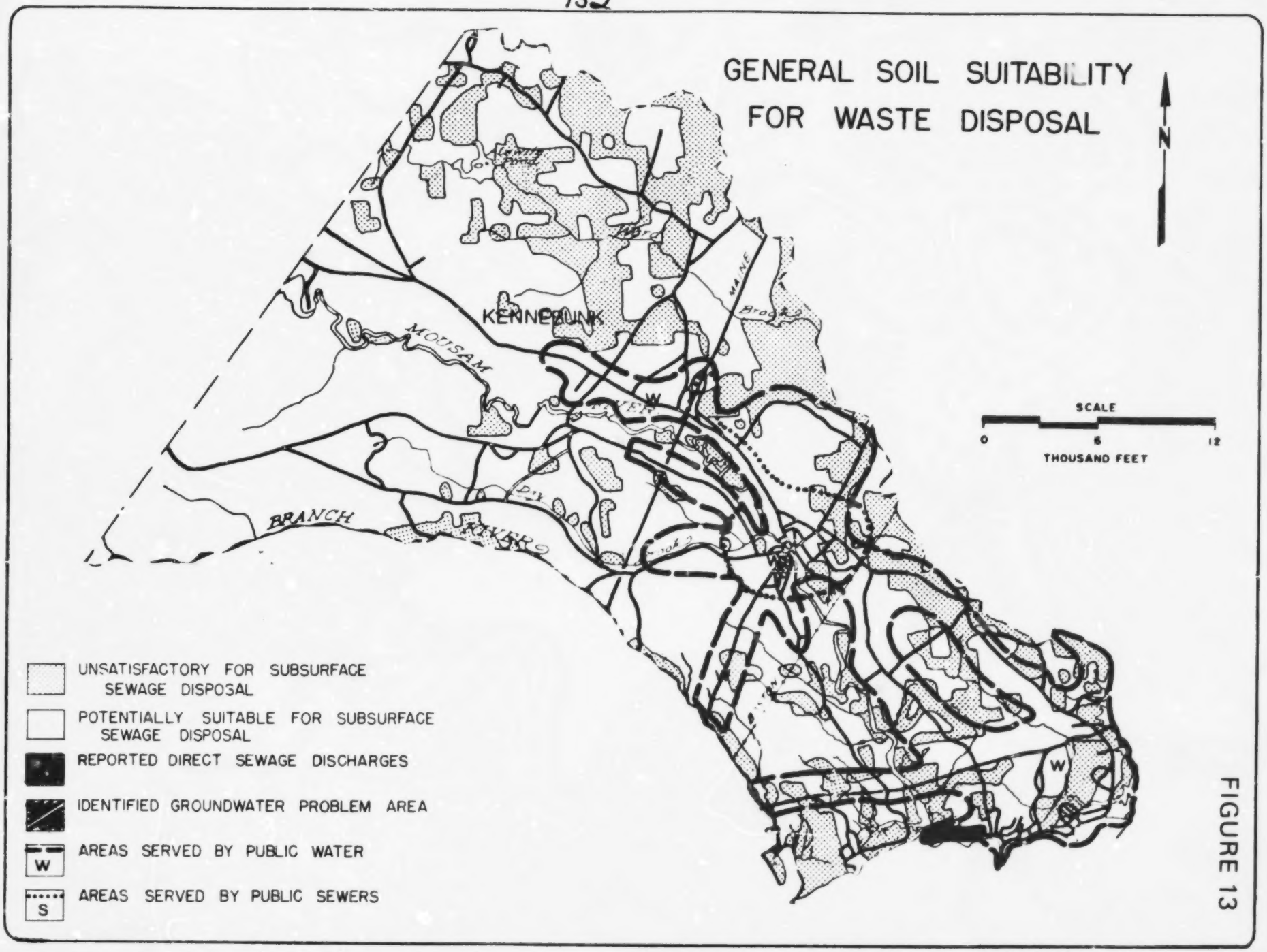
GENERAL SOIL SUITABILITY
FOR WASTE DISPOSAL
N
SCALE
0
6
12
THOUSAND FEET
KENNEBUNK
MOUSAM
BRANCH
RIVER
MAINE
W
UNSATISFACTORY FOR SUBSURFACE SEWAGE DISPOSAL
POTENTIALLY SUITABLE FOR SUBSURFACE SEWAGE DISPOSAL
REPORTED DIRECT SEWAGE DISCHARGES
IDENTIFIED GROUNDWATER PROBLEM AREA
AREAS SERVED BY PUBLIC WATER
AREAS SERVED BY PUBLIC SEWERS

FIGURE 13

The densely populated areas in Kennebunk are for the most part presently served by wastewater collection systems. In 1976 subsurface sewage disposal systems in the Chase Hill Road area created a potential public health hazard and residents sought a sewer extension to alleviate problems. Construction of a sewer to collect wastewater from residences along the road was begun in the fall of 1976. No similar problems are evident in other parts of town. Upgrading the level of treatment and rehabilitation of existing sewers thus have a higher priority at present than does expansion of the sewerage service area.

Kennebunk is serviced by two primary wastewater treatment plants, the Water Street plant (NPDES Permit No. ME100935/Maine Waste Discharge License No. 836) and the Boothby Road wastewater treatment plant (NPDES Permit No. ME0100277/Maine Waste Discharge License No. 839). Both plants were constructed in 1960 and service combined sewer systems.

The Water Street wastewater treatment plant discharges to the Mousam River, a Class SC waterway. Unit operations and processes include grit removal, comminution, sedimentation, and chlorination. The plant is designed to treat an average flow of 1 MGD; the peak hydraulic capacity is 3.0 MGD. Actual flow rates have averaged 0.18 MGD; peak wet weather flow rates have approached 0.9 MGD. BOD and total suspended solids sampling information is not available; however, EPA has judged the discharge from the Water Street plant to be typical of primary effluent. Fecal coliform counts have averaged 0 colonies per 100 ml. According to EPA, the facility complies with its permit discharge limitations of 3.0 MGD for monthly average flow, 0.5 ml/l for effluent settleable solids and 15 fecal coliform colonies per 100 ml of effluent.

The Boothby Road treatment plant is similar in construction to the Water Street facility. The plant discharges to Gooch Creek, a tributary of the Kennebunk River, and has a design capacity of 0.2 MGD. Actual flow rates have averaged 0.18 MGD with peak daily flows approaching 0.7 MGD. Unit processes and operations include grit removal, comminution, sedimentation, and chlorination. The plant is not used for septage disposal.

Influent BOD concentrations average 241 mg/l. Effluent BOD concentrations average 138 mg/l, an average removal efficiency of 43 percent. Influent total suspended solids concentrations average 250 mg/l. Total suspended solids effluent concentrations average 130 mg/l, an average removal efficiency of 48 percent. Fecal coliform effluent concentrations have averaged 0 colonies per 100 ml. The facility appears to comply with its permit discharge requirements of 0.5 ml/l for effluent settleable solids for 15 coliform colonies/100 ml of effluent.

Sources of pollution in this coastal area are the waters of both the Mousam and Kennebunk Rivers. The Town of Kennebunk's Boothby Road primary plant which discharges to Gooch Creek, a tributary to the Kennebunk River, is believed to be a major source of pollution in the estuary.

2. Alternatives and Recommendations

One of the high priority needs with regard to the town's wastewater collection system is to convey flows from the Beach area (where the existing treatment facility will be abandoned) to an upgraded Water Street facility in the Village. The Town's 201 consultant has evaluated a number of alternatives for collection - treatment and this alternative has been shown to be the least costly. Estimated capital cost of the pump station force mains and interceptor sewer need to convey the wastewater is $920,000 ($92,000 local share).

Much of the discussion at public hearings on the 201 plan has centered around whether a collector sewer should be installed to ultimately serve the Sea Road area. Although this area is potentially developable if sewers are installed, the decision to sewer this area or any other in the Town of Kennebunk rests with the local people. The town must decide how, where and if it will grow.

Another consideration is the need for this "collector sewer" with respect to relieving health hazards from on-site wastewater disposal systems. Presently there are two subdivisions, one with about 70 homes and the other with 25 homes, which rely on subsurface disposal. If severe problems develop in the future with these on-site systems there may be a need to install this "collector sewer" to relieve the problem. Once installed, it could open up the Sea Road area to high density development.

Another high priority need is to reduce the amount of groundwater (infiltration) and inflow entering the wastewater collection systems in both the Village and Beach systems. A sewer system evaluation survey should be conducted to determine specific locations of excessive leakage and inflow into the pipe network, quantify the amount of flow entering, and utlimately develop a cost-effective program for the repair and rehabilitation of the sewerage system. Preliminary findings by the Town's 201 consultants indicates it would be cost-effective to identify and eliminate approximately 500,000 gpd of infiltration/inflow at an estimated cost of $500,000. Most of this work would be eligible for 90% Federal - State aid.

In accordance with Federal regulations, the Kennebunk Sewer District must provide secondary treatment of its wastewater. The recently completed 201 Facilities Plan for the Sewer District evaluated alternatives to upgrade the level of wastewater treatment from primary to secondary. These alternatives were as follows:

1) Expand and upgrade both the Boothby Road and Water Street primary treatment facilities to provide secondary treatment.

2) Treat all wastewater at an expanded and upgraded Water Street facility (secondary treatment), interconnect the Village and Beach areas with an interceptor - force main, abandon the Boothby Road facility as a treatment plant and replace the existing Boothby Road pumping station. The Water Street facility would be used to treat excessive stormwater flows (greater than 3.0 mgd) and the Boothby Road treatment facility would be abandoned.

3) Construct a new treatment facility between the Village and Beach areas. The Water Street facility would be used to treat excessive stormwater flows (greater than 3.0 mgd) and the Boothby Road treatment facility would be abandoned.

4) Treatment of Kennebunk Beach wastewaters at Kennebunkport's secondary facility.

Preliminary screening of treatment alternatives and treatment of all wastewater at an expanded and upgraded Boothby Road facility indicated that further detailed evaluation was not warranted. Land disposal was not feasible because of the lack of suitable soils and problems associated with storage of wastewater during the winter months.

The cost-effectiveness analysis of the four alternatives presented in the Kennebunk facilities plan indicated that Alternative 2 was least costly (total capital cost about $5.2 million).

Further analysis in the facilities plan of the various types of treatment for Alternative 2 showed that the use of rotating biological contractors (a type of secondary treatment) would be cost-effective. The use of rotating biological contactors (RBC) is relatively new and operating data on existing facilities is limited. Major advantages of RBC systems are ease of operation, lower energy consumption and solids generation.

The existing primary clarifer is planned to be used for treatment of excess storm flows followed by chlorination (bypass before secondary treatment units). Presumably, when the sewer system evaluation survey is completed, the resulting report will provide information on the extent to which inflows from catch basins should be reduced or treated. Ideally, the effects on water quality and not just cost-effective solutions should be considered. Fecal coliforms appear to be the only concern with regard to water quality in the lower Mousam. It would appear to be in the best interest of all parties to obtain some water quality data on stormwater flows in Kennebunk before determining what course of action the Sewer District should take with regard to separation of sources of inflow. Similarly, the state should undertake sampling many of its rivers (particularly in estuaries where shellfishing takes place) during rainy periods to determine the effects of both effluent from wastewater treatment facilities and stormwater entering rivers.

Summary of Recommendations

The highest priority with regard to improving water quality in Kennebunk is to provide secondary treatment of wastewater before discharge. It is recommended that the Boothby Road primary treatment facility be abandoned and the Water Street facility be upgraded and expanded to accommodate flows from both the Village and Beach areas. The long-term use of the existing primary facility atthe Village for treatment of excess stormwater flows should be based not only on a cost-effectiveness analysis, as would be done in a sewer system evaluation survey, but also on the effects on water quality. Of primary concern in meeting "B" standards of classification in the Lower Mousam River is the contribution of fecal coliform bacteria from stormwater and from sources upstream of Kennebunk.

Another need is to conduct a sewer system evaluation survey to locate specific areas of excessive infiltration and inflow to the wastewater collection system and to determine a cost-effective program for rehabilitation and separation (including water quality considerations).

Expansion of the wastewater collection system to serve the Sea Road area is a local decision. In order to minimize the need for future investment of funds in public sewerage systems, the Town must take measures to allow future development on only those areas with soil capable of handling on-site disposal systems and to require that building lots be adequate in size to expand, rehabilitate or completely reconstruct on-site systems on the same lot in the future. Where on-site water systems must also be provided, there is a need for larger lot sizes. Without such planning, construction of public sewers is inevitable in order to relieve potential health and water quality problems.

B. Management Considerations

1. Existing Conditions

The Kennebunk Sewer District owns and operates the wastewater collection and treatment system in the Town of Kennebunk.

2. Alternatives and Recommendations

The following management methods were considered and discussed in the management section of the 208 plan.

a. One single regional sewer district
b. County management of all facilities
c. Management by watershed
d. Management by sewer district for each population center
e. No change in the institutional arrangements

Although a single regional sewer district, county management, or other areawide/regional management agency would tend to reduce overall administrative costs and improve consistency in the provision of collection and treatment services, the establishment of such new agencies requires extensive, new legislative and institutional frameworks. Consequently implementation of a new authority may require a long period of time. Also, individual towns would have a reduced ability for self-determination regarding a town's desires for municipal services and population growth.

The analysis of these potential management agencies resulted in the conclusion that the existing cities, towns, and sewer districts have the authority to design, construct, and manage wastewater collection and treatment facilities. In addition, by minimizing institutional changes, the existing agencies and officials that have participated in the development of the Plan will likewise participate in the immediate implementation of the Plan. Therefore, existing management agencies should continue to design, construct, and manage wastewater collection and treatment systems.

C. Impact Assessment

As a high priority recommendation, modifications to Kennebunk's wastewater collection and treatment facilities have been assessed for their impact in a qualitative manner utilizing a summary matrix. This matrix presents the major proposals for Kennebunk's system and relates these to the natural and cultural factors that may be impacted through primary or secondary effects of the proposed facilities.

The following is a discussion of a major issue in Kennebunk related to the facility proposals: provision of sewer service to an area that is relatively sparsely developed, yet subject to potential growth and development pressures. This discussion was presented at a public hearing in Kennebunk which resulted in the Sewer District agreeing to allow the public to decide whether to install the collector sewer.

> The recommended alternative, as described in the engineering report, includes a collector sewer to be installed at the same time as the force main along the Sea Road for an approximate cost of $200,000. The basis for installing the collector sewer now is that it is assumed that sewer service will be required along the Sea Road eventually and that it is cheaper to put it in the trench that has to be dug for the force main, rather than to install it later. Upon installation, there would be no connections to the sewer. <u>However, it should be emphasized that the town has an important choice as to whether that collector sewer should be installed or not, and that the implications of that choice are significant in terms of land use, population growth and municipal costs</u>.

The first implication is that housebuilding and population growth will almost certainly be given a shot-in-the-arm by the availability of the Sea Road collector sewer. In a period when housebuilding is already rather rapid (averaging about 75 new homes every year in Kennebunk, since 1970), the town must consider whether the proper medicine is a shot-in-the-arm or a sedative. The evidence in support of this statement is partly drawn from the effects of large-scale sewer projects elsewhere, and partly from the local context.

The new sewer system, if it includes the proposed gravity-fed collector sewer along the Sea Road, would open up an area of about 750 acres of land which is presently not buildable because the soils generally don't meet State Plumbing Code requirements. (They are classified as "non-discharge" soils, on which new septic systems may not be built, except to replace malfunctioning ones serving existing houses). Under current zoning for 20,000 sq. ft. lots, there would be potential for up to 1500 more houses in Kennebunk than there would be by leaving the Sea Road unsewered. Regarding evidence of the impact of large sewer projects on growth in other towns, a recent Federal study called "The Growth Shapers", has concluded that when such projects are built "in areas with heavy growth potential, local zoning and planning often cannot control the development pressures which sewers release". Besides inducing population growth, large sewer projects also stimulate "leap frogging". "Leap frogging" is the development of land not adjacent to the existing built-up area, and is popular with developers because that land is cheaper for them than land closer to the urban fringes. However, this type of sprawl is the most expensive form of development for the town to serve, in terms of municipal services.

This observation is related to the second basic land-use impact of the proposed collector sewer. A collector sewer along Sea Road would almost inevitably lead to the suburbanization of the open space which now separates the Upper Village from the Beach. In making possible the construction of up to 1500 new houses in this area, the collector sewer would blur the distinction between the built-up areas and the open countryside, thereby diminishing the rural character of Kennebunk. It would make it difficult to maintain a rational pattern of development related to the existing population and service nodes at the Upper Village and the Beach.

Another important point is that water quality considerations do not reflect the need for providing sewer service to the Sea Road area. The relatively few problems with existing septic systems in the area can be addressed less expensively onsite on a case by case basis, and adherence to the Maine State Plumbing Code will largely prevent future problems related to subsurface sewage disposal. In general, with the use of available tools (Plumbing Code, zoning subdivision ordinance), moderate development could proceed under suitable conditions without detriment to the Town's water resources or natural environment.

In summary, to sewer or not to provide a collector sewer along Sea Road is a local decision which should be made with full understanding of the implications for land use, population growth, and municipal costs.

Sewage Disposal - Subsurface Systems Disposal

A. Technical Considerations

1. Existing and future conditions

The two sewerage systems in the Town of Kennebunk presently serve about 60 percent of the 5,500 permanent residents, but only a small fraction of the Town's total land area. Outside of the two population centers, development is generally sparse and scattered, with residents relying on individual subsurface sewerage disposal systems. Review of a soil suitability map for subsurface wastewater disposal prepared by the Southern Maine Regional Planning Commission indicates soil in a large portion of the unsewered areas in the Town are not well suited for onsite sewage disposal.

Kennebunk's developed coastal areas are, at this time, mostly connected to municipal sewers, so that these coastal areas are not considered to be a major source of pollution to the tidewaters through subsurface disposal.

2. Alternatives and Recommendations

Subsurface sewage disposal must remain as the major treatment and disposal method for domestic sewage wastes for rural or unsewered areas in the 208 region (cost of public sewers in these areas is prohibitive). Where problems have been defined, sewer service has been evaluated as an alternative to subsurface sewage disposal systems (see Sewage Disposal - Collection and Treatment Systems). Additionally, alternative toilet systems may be used to reduce the potential impact of sewage wastes on soils and groundwater.

In order to minimize future extensions of the wastewater collection system in the future, the Town should consider adopting Appendix 1 of the State Plumbing Code (which provides guidelines for minimum lot sizes where on-site systems are used--this is not a regulation) as part of the zoning ordinance.

B. Management Considerations

1. Existing Conditions

Each town presently regulates subsurface waste disposal in accordance with the State Plumbing Code. Each town has its own Local Plumbing Inspector (usually part-time) who is responsible for issuing permits and enforcing the Code. Soils analysis is done by State certified soil investigators. They submit soils reports to the Plumbing Inspector and the State Department of Human Services. Maintenance is the individual's responsibility; however, there is no legal requirement for maintenance or inspection of systems after installation.

Malfunctioning sewage disposal systems are declared by law to be a nuisance and must be abated upon order by the municipality.

2. Alternatives and Recommendations

The Maine State Plumbing Code is protective of the environment through proper design and installation of subsurface sewage disposal systems.

C. Impact Assessment

The major issue associated with this waste source is the increased local cost to implement an improved enforcement and inspection program related to the Plumbing Code. This moderate increase in cost will be balanced by improved reliability of subsurface sewage disposal resulting in improved water quality, health, and safety. Kennebunk paid $1,500 in salary for a code enforcement officer in 1976. A regional code enforcement program shared with Kennebunkport would cost an estimated $6,200 per year. This cost for maintenance and enforcement of the Plumbing Code could save potential investments in expensive sewage facilities by assuring the reliability and effectiveness of subsurface disposal.

A secondary impact of this action will affect the homeowners with malfunctioning septic systems. Mandatory rehabilitation is expected to cost the homeowner of a malfunctioning system from $20 for pumping to $2,000 for replacement.

Sludge Disposal

A. Technical Considerations

1. Existing and future conditions

The Town of Kennebunk currently generates approximately 25 cubic yards of waste treatment plant sludge annually. The sludge is anaerobically digested and buried at the Kennebunk solid waste disposal area. The site is located on the east side of the Kennebunk Beach Road, approximately one half mile north of the intersection of Kennebunk Beach Road and Heath Road.

The disposal site is located in an abandoned gravel pit. Consequently, available data does not indicate soil type at the bottom of the excavation. The sludge is covered by a sandy material found at the site.

Since the disposal site is located in a depressed gravel pit, surface runoff is not a significant water quality concern. Based on geologic and topographic considerations subsurface drainage probably flows in a westerly direction. The closest water body in the probable flow path is the Mousam River, approximately one quarter mile west of the site.

The 201 facilities plan for Kennebunk calls for upgrading the treatment plant and installing aerobic sludge digestion followed by mechanical dewatering. This should result in a substantially increased sludge volume. The present area at the solid waste disposal site may then not be adequate for sludge disposal. Treatment of septage at the plant would also increase sludge volume.

The Kennebunk, Kennebunkport and Wells Water District utilizes Branch Brook as its water supply source. The treatment plant generates approximately 400 cubic yards of sludge annually (dry basis). The sludge has a solids concentration of approximately 0.5% consisting of the following components:

$Al(OH)_3$	50%
$Ca(OH)_2$	25%
$Ca(CO_3$	20%
Organic & Inorganic Substances	5%

The slurry is currently being returned to Branch Brook. The district plans to utilize lagoons to dispose of the sludge. Here the settled sludge will be decanted and the residual placed on drying beds. Eventually the sludge will be landfilled at the Kennebunk refuse disposal area.

Keuffel and Esser recently installed a wastewater treatment system employing ion exchange and mechanical dewatering which generates approximately 10 gallons of sludge per day. Currently, the sludge is being stockpiled at the site. We would not recommend that this sludge be disposed of on the land without careful site evaluation. The possibility of metal recovery and reuse should be closely evaluated. They may result in a residual which could be safely disposed of on the land by conventional sludge disposal techniques.

2. Alternatives and Recommendations

The Plan has looked at a number of technical alternatives including incineration, composting, and land disposal for sludge. Kennebunk has many areas which exhibit suitable soils for sludge disposal. These are located predominately in the western portion of the town. Those sites which appear suitable with respect to existing land use and soils have been identified on the soil suitability map.

Another possible sludge disposal site is the existing approved septage disposal site. Other sludge disposal alternatives include use as a soil conditioner and incineration in Saco, both of which are addressed in the Plan.

The present site can continue to be used for the time being but the municipality should investigate potential new sites or the use of other disposal methods when the new secondary treatment facility is constructed and operational in the early 1980's.

B. Management Considerations

1. Existing Conditions

The municipality is responsible for providing an approved sludge disposal site and operating the site in accordance with state regulations for land disposal of sludge. The state regulates the location of the site, application, loading rates, and maintenance of the site to protect the health of the community, and to prevent drinking water contamination.

2. Alternatives and Recommendations

The existing management agencies have the requisite authority to properly carry out the task of sludge disposal. No management changes are recommended. However, thorough, uniform enforcement of state regulations should be pursued.

C. Impact Assessment

The general recommendation stated above is to undertake a detailed feasibility study for the anticipated sludge to be generated by the new secondary treatment facility. Applicable disposal alternatives have been identified and assessed in general in the Plan. A more detailed impact assessment will be required once the feasibility study develops a specific reommendation. The alternatives are assessed in a qualitative manner in the Impact Assessment Matrix. This can serve as a guide for the municipality in evaluating the alternatives.

Solid Waste Disposal

A. Technical Considerations

1. Existing and Future Conditions

The Kennebunk disposal site is located in an abandoned gravel pit on the Sea Road, approximately one mile south of the center of town. Solid waste is deposited in a two to three acre section of the pit. The site is operated as a non-burning dump. There is some compaction and the refuse is covered with sandy soil found on site. Cover is poor in many areas. The nearest residence is approximately 500 feet away but is serviced with public water. A fence restricts view of the site to a certain degree. The town anticipates a life of 5-10 years for the site, and has considered purchasing a shredder to further extend the life. The town generates 5,100 tons per year of refuse (with an estimate of four pounds per capita per day). The town does not have a major contribution of solid waste from industry. If the site were operated as a landfill or with shredded refuse, and according to DEP rules and regulations, the life could be extended from 10 - 15 years.

Soils surrounding the Kennebunk dump are generally sandy glacial outwashes. They range from a well drained Windsor to a poorly drained AuGres soil. These soils do not meet DEP criteria for use for solid waste disposal. Groundwater was not seen in the base of the pit but apparently is not far beneath the surface. Groundwater flows from the pit are either to the Mousam or Kennebunk Rivers. No apparent leachate problem has developed, however, and there are no wells to be affected in this area.

2. Alternatives and Recommendations

A new disposal facility will be required within the planning period. The alternatives discussed in the Plan include: sanitary landfill, baling and shredding, incineration, and incineration with heat recovery. Regional disposal systems have also been evaluated for Kennebunk, Arundel, Kennebunkport and Wells. Costs have been compared on an individual town basis and with the towns together as a region.

ESTIMATED ANNUAL SOLID WASTE DISPOSAL COSTS - ALTERNATIVES

	Annual Generation	Sanitary Landfill	Baling or Shredding	Incineration	Incineration with Heat Recovery
The Region	18,300	$109,800 $6/T	$164,700 $9/T	$292,800 $16/T	$160,125 $8.75/T

Annual generation of solid waste in the Wells-Kennebunk-Kennebunkport-Arundel region is 18,300 tons. Landfill is probably the only acceptable disposal option viable in the region. A regional landfill would cost $6 per ton.

The number of suitable landfill sites in the region is not great, and most of these sites would require a great amount of modification to be environmentally acceptable. This becomes cost effective only with large disposal volumes. The estimated costs of operating individual and regional landfills is shown below. Although regional landfill is the most cost effective disposal method available for the towns within the region, transportation costs for most of the towns will increase. This added cost will not be great, however, and will not necessitate the use of transfer stations for transport within the region.

ESTIMATED ANNUAL SOLID WASTE DISPOSAL COSTS - INDIVIDUAL VERSUS REGIONAL

Municipality	Annual Generation	Sanitary Landfill
Arundel	1,900	$13/T
Kennebunk	7,000	$8.50/T
Kennebunkport	2,800	$11/T
Wells	6,600	$9/T
Region	18,300	$6/T

B. Management Considerations

1. Existing Conditions

The municipality of Kennebunk owns and operates a solid waste disposal site.

2. Alternatives and Recommendations

Kennebunk has the option of continuing to own and operate their disposal facility or joining a regional disposal system. A regional disposal district may be established by a special district or interlocal agreement. The cost estimates for waste disposal support selection of the regional system.

C. Impact Assessment

Although cost estimates indicate that a regional landfill is the most cost-effective method for solid waste disposal in Kennebunk, further study of the political and technical opportunity will be required prior to the development of a firm recommended course of action.

In general, the alternative processing and disposal methods investigated in the plan primarily impact air and water quality. Sanitary landfills, regardless of the solid waste processing method selected, can impact water quality (groundwater and surface water) through generation of leachate. Incineration as a processing method reduces water quality impact while generating potential air quality impacts. Incineration with heat recovery has the same environmental impacts as standard incineration but reduces the economic impact (high cost of incineration) through revenues from sale of steam. Baling and shredding do not reduce water quality impact from leachate, but rather may provide economic benefit through increased landfill life. Source separation provides benefits through reduction of waste that must be disposed. These impacts are summarized in the Impact Assessment Matrix.

Industrial Waste Disposal

A. Technical Considerations

1. Existing and Future Conditions

While the existing municipal waste treatment plant presently provides only primary treatment, the following discussion is based on the assumption that the Town will add secondary units in the near future. The information on local industries was obtained from the New England Manufacturers Directory, a brief local questionnaire, and several other sources. Field inspections were not a part of the study. What is presented serves as a starting point; recommendations for additional effort before accepting new industrial wastes at the municipal plant are presented in the Point Source Control Chapter.

Response to the SMRPC questionnaire indicated that the following industries were discharging "sanitary" waste only to the municipal waste treatment plant: Kesslin Shoe Company, Arlen Box Company, Keuffel and Esser Company, two laundromats, a dignostic laboratory, and two drug stores that were not developing film on site. All of these "sanitary" wastes are compatible for treatment at the proposed secondary treatment facility.

The industrial waste from Keuffel and Esser Company is treated at their own treatment facility that is operated under an EPA NPDES permit. This facility went on-line in September 1976 and discharges to the Mousam River just upstream of the Water Street treatment facility.

Five other industries, Telstar Electronics, Data Packaging Corp., Keyes Fiber Company, (Sales Office), Thundering Banshee, and Coastal Rug Cleaners are all reported as having their own on-site disposal facilities.

The Keuffel and Esser Company recently began operation of a privately-owned treatment facility. As long as flows and loads do not increase significantly there should be no detrimental effect on water quality or marine life downstream.

In the near-term future there should be no more discharge to Branch Brook from the water treatment facility of the Kennebunk, Kennebunkport, Wells Water District. Sludge discharge should be eliminated by July 1, 1977 and filter backwash water discharge eliminated prior to 1979.

2. Alternatives and Recommendations

No industrial waste problems have been defined in Kennebunk. Without further detailed study, the potential effects of Keuffel and Esser Company's discharge, including aluminium, chromium, and copper, cannot be assessed. However, the permitted waste loads from the facility are sufficiently low that even minimal dilution in the river would reduce the metal concentrations to low levels. New waste treatment facilities were brought into operation in the fall of 1976 which reportedly reduce metal concentration in the plant effluent to near zero.

B. Management Considerations

1. Existing Conditions

Controls are established and administered by sewer districts or municipalities if the industry discharges into the sewer system. Direct discharges into receiving water bodies are regulated through the NPDES permit system.

2. Alternatives and Recommendations

Administration of controls on industrial waste discharge to municipal and sewerage systems should remain with the existing management agencies. Enforcement of pretreatment standards and other requirements should be improved by establishing adequate sewer use ordinances and industrial waste survey programs as described in the Plan.

As part of the Federal involvement in water pollution abatement activities, funding programs should be expanded to research of heavy metal effects on riverine and estuarine environments. The State role in water quality sampling should be expanded to include adequate monitoring of discharges of toxic pollutants.

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C. Impact Assessment

What is called for is more active involvement or interaction between city officials and local industries to determine more accurately the waste flows to the municipal plant and the effect those wastes have on plant operation. While improving the operation and efficiency of the municipal plant, involvement of the City in such a program will tend to increase administrative costs. Additionally, pretreatment requirements, equalization of flows, minor-process changes, or water conservation measures will tend to increase costs to local industries. These increased costs will be balanced by improved treatment of wastewater flows (hence a water quality benefit), and increased capacity of the treatment plant.

Runoff from Development

A. Technical Considerations

1. Existing and Future Conditions

The Town of Kennebunk, at this time, has two sewered areas--one in the village (on both sides of the Mousam River) and the other in the beach area (to the west of the mouth of the Kennebunk River).

Separate storm sewers are present but limited in both areas of Town, and they consist, in general, of short sections of pipe connected to one or two catch basins. Outfalls (several dozen in number) from these storm sewers discharge to natural drainage courses leading to the Kennebunk and Mousam Rivers and to the ocean.

Combined sewers exist in the Village and three overflow points for this subsystem discharge to the Mousam River.

Rainfall in the area, when transformed into runoff, may be intercepted by storm sewers or combined sewers, or it may run off the land following natural drainage courses.

The Town's developed area can be considered in two sections - the Village and beach sections. For each area the "rational method" has been applied in order to estimate the volume of runoff from a typical storm event of the intensity and duration that characterizes an average once-a-week storm.

STORMWATER RUNOFF PER WEEKLY STORM EVENT

Developed Area	Drainage Acreage	Volume Per Storm	Receiving Waters
Village area	330 acres	1.42 MG	Kennebunk River
	690 acres	2.99 MG	Mousam River
Beach area	150 acres	0.65 MG	Kennebunk River
	110 acres	0.47 MG	Atlantic Ocean

2. Alternatives and Recommendations

No specific urban stormwater related problems have been identified. However, altering, development or encroachment on the Town's numerous wetlands areas could cause future problems. Thus, the maintenance of existing wetlands should be carefully considered in formulating the Town's growth and development policy.

Treatment of separated storm flows (no wastewater included) should take a low priority at this time. Before any treatment is considered, sampling of stormwater flows should be done to ascertain the actual characteristics of this point source of pollution.

After the Kennebunk Sewer District completes the sewer system evaluation survey and cost-effective rehabilitation and inflow reduction work, the bypass/overflows to the Mousam River will be practically eliminated. At this time it is proposed to use the existing primary sedimentation basin at the Water Street facility to treat excess stormwaters prior to chlorination and discharge. However, the sewer system evaluation survey coupled with an updated cost-effective analysis will provide the Sewer District with the detailed information needed to determine the least costly alternative to handle these overflows.

The water quality effects of the separation of storm flows should also be considered in the determination of how much inflow should be separated or treated. Fecal coliform bacteria appear to be the only limiting factor in enabling the lower Mousam to meet "B" standards of classification.

B. Management Considerations

1. Existing Conditions

The primary responsibility for controlling storm water runoff rest with the municipality. However, where combined sewer systems are under management of a sewer district, responsibilities are shared.

2. Alternatives and Recommendations

Runoff from development can be limited by local codes and ordinances such as subdivision regulations and zoning ordinance performance standards. Additionally, the State Site Location Law requires erosion and sediment control plans for new development. The existing management agencies have adequate authority to control runoff. The Town has the authority to regulate the use of land to limit runoff and the local treatment authority has the power to control collected runoff. Therefore, no institutional changes are recommended. However, to improve controls to limit runoff municipalities are urged to review, modify and adopt the model subdivision regulations and zoning ordinance performance standards included in the Plan. A technical review team should be funded through federal, state, and local sources, to assist the municipality in establishing ordinances and in the review of proposed developments.

C. Impact Assessment

The essential purpose of the recommended ordinances is to minimize the increase of runoff from developed lands, attempting to maintain to the extent possible the natural runoff conditions. This action will tend to eliminate storm related discharges to surface waters and reduce the potential for flooding. Controlling stormwater runoff at the source will decrease the demand for expensive collection and transport facilities.

A secondary impact of the implementation of the ordinances will be increased land development costs.

Runoff from Agriculture

A. Technical Considerations

1. Existing and Future Conditions

The land use/land cover map indicates there are about 30,000 acres in agricultural use in the 208 area (12.9% of the land area). Only 10,000 acres are under intensive farming as cropland, the rest being open pasture or hay fields. The Soil Conservation Service has estimated that 66% of the farms are operated under the guidance of Conservation Plans designed to limit soil loss from the land. Because of this, the erosion and sedimentation problems associated with agricultural land use and the potential water quality impact of runoff from these lands is considered minor for this region.

2. Alternatives and Recommendations

Structural controls to minimize agricultural runoff must be applied on a site specific basis. The Soil Conservation Service's recommended agricultural practices and controls for soil loss developed through Conservation Plans are sufficient to protect water quality in this region. Nonstructural control recommendations are in the Land Use Chapter of the Plan as locally enforced Performance Standards (see Management Considerations below).

B. Management Considerations

1. Existing Conditions

Municipalities have the authority to manage land use controls. The Saco River Corridor Commission manages the land within 1000 feet of the Saco River. Voluntary USDA programs are administered by S.C.S. and A.S.C.S. The federal programs offer technical and financial assistance to farmers to control soil loss.

2. Alternatives and Recommendations

Funding of USDA programs should be continued. Additional money should be channeled into the A.S.C.S. Program and the $2,500 cut-off per project should be raised.

Municipalities should review, revise and adopt appropriate versions of the Model Performance Standards for control of runoff and soil loss. A technical review team should be funded by federal, state, and local sources to assist the municipality in the establishing of ordinances and in the review of proposed developments.

C. Impact Assessment

The essential purpose of the recommended ordinances is to minimize the increase of runoff from agricultural lands attempting to maintain to the extent possible the natural runoff conditions. This action will tend to eliminate storm related discharges to surface waters and reduce the potential for flooding.

A secondary impact of the implementation of these ordinances will be increased costs of agricultural land use.

Salt Storage and Application

A. Technical Considerations

1. Existing and Future Conditions

Salt (sodium chloride) is used in Southern Maine to achieve bare pavement conditions during the winter months. Salt will continue to be used as long as the bare pavement policy is mandated and other highway de-icing chemicals are not used because of their prohibitive cost. Surface water quality problems have not been associated with highway de-icing salt uses. However, a small number of individual water supplies have been found to exceed chloride standards.

2. Alternatives and Recommendations

Since use of highway de-icing salt compounds will continue, general guidelines have been presented for the storage, handling and application of these compounds. These guidelines are sensitive to the conflicting policies of bare pavements in winter and clean water and attempt to strike a balance between the two.

B. Management Considerations

1. Existing Conditions

The State and municipalities have the authority and responsibility to maintain roads and highways in the region. The State has established guidelines and procedures for highway de-icing salt storage and application, and has developed educational and training programs for local operators.

2. Alternatives and Recommendations

Existing Maine laws should be investigated for enforcement powers related to regulate the use of highway de-icing compounds. In the absence of enforceable regulations and state level standards adequate forprotection of the environment and compatible with policies related to winter driving conditions, MDEP, MDOT and the other agencies should collaborate on their development. This program development should include a series of checks and balances through required reporting, surveillance and/or sampling, and analysis.

C. Impact Assessment

Continued use of highway de-icing salt for road maintenance in the winter months will present a potential threat to surface and groundwater quality. Following recommended practices for storage and application of the salt will minimize the potential for water quality degradation while maintaining bare pavement policy. These practices may tend to increase the costs of providing facilities for salt storage; however, costs may be partially offset by the resulting conservation of salt.

Runoff from Construction Activities

A. Technical Considerations

1. Existing and Future Conditions

Because of the need to remove the cover vegetation and leave areas exposed during many construction projects, the potential for erosion and sedimentation is great. The soil loss can be extensive and can result in significant degradation of surface water through sedimentation and siltation. Since population projections indicate continued growth and development, construction activities will remain a potential source of water pollution.

2. Alternatives and Recommendations

Since erosion and sedimentation in the study area is principally site specific, each situation or occurrence must be considered in relationship to its own setting. The two major factors to be considered in erosion and sediment control are:

a. Reduction of the raindrop impact energy which reduces its dispersing and eroding power below the critical force and

b. Reduction of the velocity of the surface runoff which, in turn, lessens its abrading power and transporting capacity.

Probably the most effective method of reducing the impact energy of raindrops are those procedures which cover the soil; e.g., natural plant cover, mulching, temporary cover crops and paving or covering with non-erodable materials. If the precipitation falling on the site is not allowed to pick up velocity as it runs off then its erosive power is curtailed. Shortening the length of slope is one of the most effective methods of controlling runoff velocities. This shortening can be accomplished by various techniques such as structural measures, cropping or management patterns, or tillage practices.

It is recommended that the most cost-effective manner of instituting methods for controlling runoff from construction activities is through local land use regulatory controls.

B. Management Considerations

1. Existing Conditions

Construction controls are implemented at all levels. The Federal government imposes controls through the Federal Highway Administration, and the Corps' activities. The State imposes controls through the Site Location Law, the Great Ponds Law, the Wetlands Act, Stream Bulldozing, and Mandatory Shoreland Zoning. The Saco River Corridor Commission imposes controls on construction activities. Local controls are imposed through subdivision and zoning regulation.

2. Alternatives and Recommendations

Since the requisite legal authority to regulate construction activities

exists, no institutional change is recommended. Municipalities should review, revise, and adopt appropriate versions of the Model Performance Standards for control of runoff and soil loss.

A technical review team should be funded by Federal, State, and local sources to assist the municipality in the establishment of ordinances and in the review of proposed developments.

C. Impact Assessment

The essential purpose of the recommended ordinances is to minimize the increase of runoff from agricultural lands, attempting to maintain to the extent possible the natural runoff conditions. This action will tend to eliminate storm related discharges to surface waters that may adversely affect water quality.

A secondary impact of the implementation of these ordinances could be increased costs for agricultural activities.

Petroleum Storage and Transfer

A. Technical Considerations

1. Existing and Future Conditions

From the evidence there is no question that petroleum products have the potential to contaminate water resources in the SMRPC 208 area. Furthermore, with the potential for more than 31 million gallons of #2 home heating fuel transferred in over 150,000 transactions and with over 16 million gallons of storage capacity within the 208 area, substantial opportunity for similar oil pollution will continue to exist for the foreseeable future. Assuming little change in present technological and other controls, spills and leaks will likely culminate in local long-term environmental degradation with little or no opportunity for corrective action.

Boating activity (specifically exhaust emissions) may not cause major adverse effects on lakes; however, support facilities (e.g., marinas selling oil and fuel and doing repair work), accidents, and negligence in the handling of petroleum products may degrade water quality.

2. Alternatives and Recommendations

This planning effort did not address the large amount of technical control methods for the handling and distribution of petroleum products.

B. Management Considerations

1. Existing Conditions

Petroleum storage and transfer are currently managed by Federal, State, and local governments. The Federal and State governments primarily regulate water transport, large on-land storage facilities, and discharge to groundwaters and surface waters. Local governments have the authority to control the siting of oil storage facilities adjacent to water bodies.

2. Alternatives and Recommendations

A State level program designed to identify the magnitude of petroleum related pollution should be developed. Applicable controls should be recommended and incorporated into legislative and regulatory programs. Local and regional input should be sought by the State in the design and implementation of the program.

C. Impact Assessment

As long as substantial volumes of petroleum products are handled, stored, transferred and consumed in the SMRPC 208 area, contamination of water resources is likely to continue. Assuming little change in present technological and management controls, spills and leaks will likely culminate in local long-term environmental degradation with little or no opportunity for corrective action. However, a state level program designed to improve the handling of petroleum products will minimize the potential for petroleum related pollution in Maine.

SOUTHERN MAINE REGIONAL PLANNING COMMISSION
AREAWIDE WASTE TREATMENT MANAGEMENT PLAN

IMPACT ASSESSMENT MATRIX KENNEBUNK

LEGEND

- ■ VERY NEGATIVE
- □ NEGATIVE
- □ NO IMPACT
- ■ POSITIVE
- ■ VERY POSITIVE

FACTORS IMPACTED

			NATURAL FACTORS																						CULTURAL FACTORS															COST COMPARISON	
			LAND		SURFACE WATERS									GROUNDWATER						AIR				FLORA			FAUNA				LAND USE						Recreation		SOCIAL						ECONOMIC				
		TECHNICAL & MANAGEMENT ALTERNATIVES	SOIL	UNIQUE PHYSICAL FEATURES	DISSOLVED OXYGEN	BIOLOGICAL OXYGEN DEMAND	SUSPENDED SOLIDS	NUTRIENTS	DRINKING WATER SUPPLY	TEMPERATURE	TURBIDITY	BACTERIA & VIRUSES	Toxic Substances & Heavy Metals	CHLORIDES	NITRATES	PHOSPHATES	HEAVY METALS	BATERIA & VIRUSES	DRINKING WATER SUPPLY	PARTICULATES	NITROGEN OXIDES	SULFUR OXIDES	TOXIC SUBSTANCES	NATURAL VEGETATION	MANAGED VEGETATION	AQUATIC VEGETATION	BIRDS	LAND ANIMALS	FISH & SHELLFISH	FOOD CHAINS	Open Space, Wetlands, Forest	AGRICULTURAL	RESIDENTIAL	COMMERCIAL	INDUSTRIAL	FISHING	WATER RECREATION	POPULATION GROWTH	DEVELOPMENT PATTERN	EMPLOYMENT	HEALTH & SAFETY	INSTITUTIONS	WATER SUPPLY	RECREATION	FISHING	MANUFACTURING	CAPITAL COST	Operation/Maintenance Cost
WASTE SOURCES	SEWAGE DISPOSAL COLLECTION & TREATMENT SYSTEMS	Treatment Alternatives: NO ACTION (CONTINUE EXISTING FACILITIES)																																														
		NEW STP, VILLAGE AND BEACH LOCATIONS			□	□	□	□																				□	□						□	□												
		NEW STP, VILLAGE; PUMP BEACH SEWAGE TO VILLAGE			■	■	■	■			■	■																■	■																		■	
		NEW STP ON MOUSAM RIVER			■	■	■	■			■	■																■	■																			
					□	□	□	□																				□	□			□	□	□														
		Regional Alternatives: NEW STP, VILLAGE; PUMP BEACH SEWAGE TO K'PORT	■		■	■	■	■			■	■																■	■			■	■	■														
		Sewer Extensions: SEA ROAD COLLECTOR	■								■	■																				■	■																
		NO SEA ROAD COLLECTOR																																															
		Management Alternatives: USE EXISTING AUTHORITY																																															
		DEVELOP NEW AUTHORITY																																															
	SEWAGE DISPOSAL SUBSURFACE SYSTEMS	Treatment Disposal Systems: SUBSURFACE WASTE DISPOSAL												■	■	■	■																■						■										
		ALTERNATIVE TOILETS												■	■	■	■							■																									
		SEWER EXTENSIONS																															■						■										■
		Management Alternatives: USE EXISTING AUTHORITY												■	■	■	■																																
		STRICT CODE ENFORCEMENT												■	■	■	■														■																		
		MAINTENANCE PROGRAM																																															
		REGIONAL CODE MANAGEMENT																																															■
	SEPTAGE DISPOSAL	Disposal Methods: NO ACTION																																															
		TREATMENT PLANT																																															
		LAND APPLICATION																																															
		INCINERATION																																															
		Management Activities: USE EXISTING AUTHORITY																																															
		REGIONALIZATION																																															
	SLUDGE DISPOSAL	Disposal Methods: NO ACTION	■											■	■	■	■																																
		LAND APPLICATION	□																																														
		INCINERATION	■											■	■	■	■																																■
		COMPOSTING	■																					■																									
		Management Alternatives: USE EXISTING AUTHORITY																																															
		REGIONALIZATION																																															■
	SOLID WASTE DISPOSAL	Disposal Methods: NO ACTION	■								■	■		■	■	■	■													■																			
		SOURCE SEPARATION	□																																				■										■
		BAILING OR SHREDDING	□								■	■		□	□	□	□													■																			■
		INCINERATION	■								■	■		■	■	■	■													■																			■
		INCINERATION WITH HEAT RECOVERY	■								■	■		■	■	■	■													■																			■
		SANITARY LANDFILL																																															
		Management Alternatives: USE EXISTING AUTHORITY																																															
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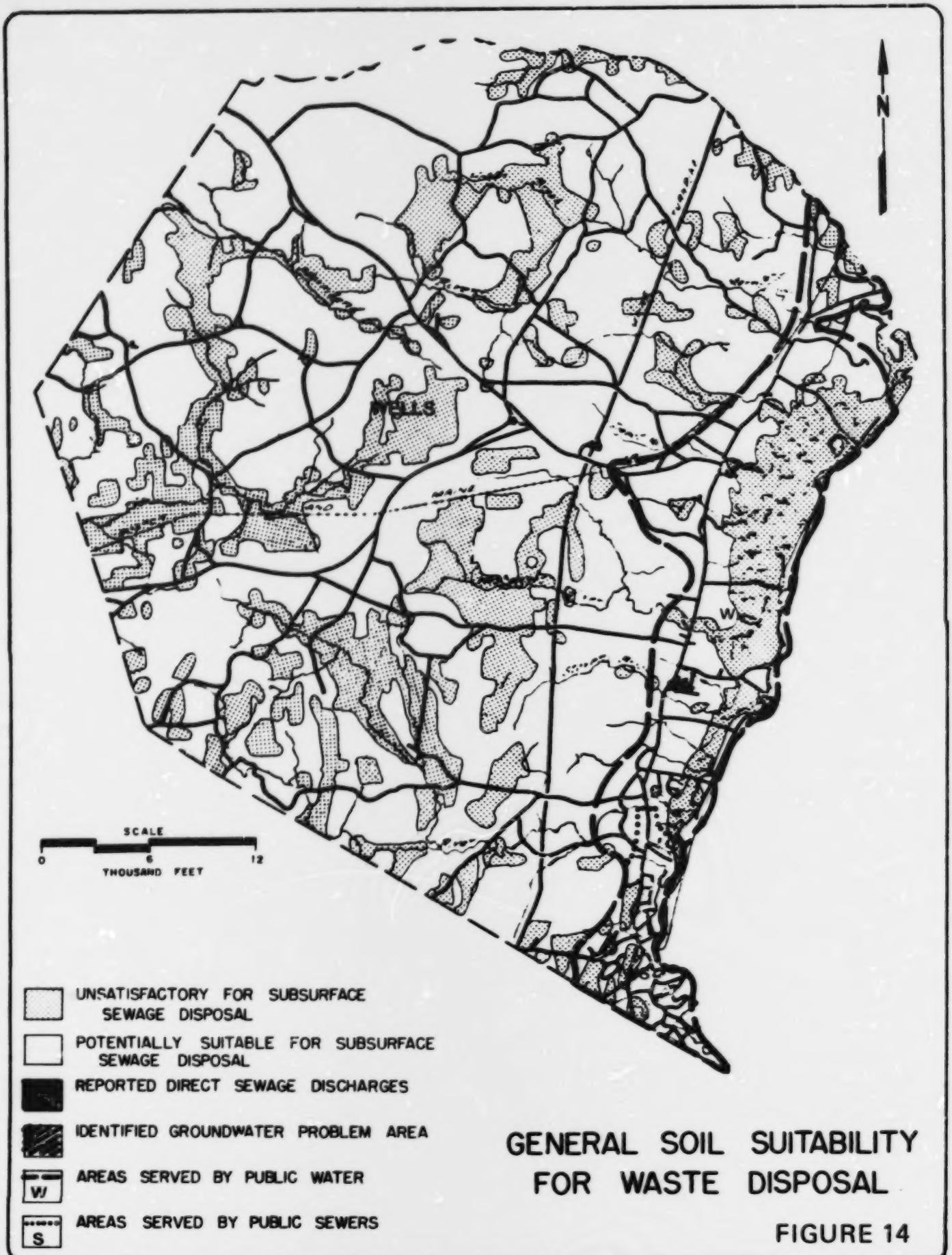

GENERAL SOIL SUITABILITY FOR WASTE DISPOSAL

FIGURE 14

WASTE SOURCES ADDRESSED	Priority*
SEWAGE DISPOSAL - SUBSURFACE SYSTEMS	⊕
SEPTAGE DISPOSAL	⊙
SLUDGE DISPOSAL	⊙
SOLID WASTE DISPOSAL	⊙
SALT STORAGE AND APPLICATION	⊕
RUNOFF FROM CONSTRUCTION ACTIVITIES	⊕
PETROLEUM STORAGE AND TRANSFER	⊕

Sewage Disposal - Subsurface Systems

A. Technical Considerations

1. Existing and Future Conditions

The Webhannet estuary is considered "marginal" for water contact recreation according to the nonpoint source control portion of the 208 Plan. Pollution problems in the Webhannet estuary stem from septic systems located on tidal flats with high water tables and sand dunes. This problem is likely to be solved, however, when municipal sewers and a treatment plant are installed in this part of Wells in the near future. Specific inland problem areas with respect to subsurface sewage disposal have not been identified by Town officials, although soil conditions in some areas suggest that the potential for problems does exist.

2. Alternatives and Recommendations

Subsurface sewage disposal must remain as the major treatment and disposal method for domestic sewage wastes for rural or unsewered areas in the 208 region (cost of public sewers in these areas is prohibitive). Where problems have been defined, sewer service has been evaluated as an alternative to subsurface sewage disposal systems (see Sewage Disposal - Collection and Treatment Systems). Additionally, alternative toilet systems may be used to reduce the potential impact of sewage wastes on soils and groundwater.

In order to minimize future extensions of the wastewater collection system in the future, the Town should consider adopting Appendix 1 of the State Plumbing Code (which provides guidelines for minimum lot sizes where on-site systems are used--this is not a regulation) as part of the zoning ordinance.

B. Management Considerations

1. Existing Conditions

Each town presently regulates subsurface waste disposal in accordance

* ⊙ PRIORITY ⊕ LOW PRIORITY

with the State Plumbing Code. Each town has its own Local Plumbing Inspector (usually part-time) who is responsible for issuing permits and enforcing the Code. Soils analysis is done by State certified soil investigators. They submit soils reports to the Plumbing Inspector and the State Department of Human Services. Maintenance is the individual's responsibility; however, there is no legal requirement for maintenance or inspection of systems after installation.

Malfunctioning sewage disposal systems are declared by law to be a nuisance and must be abated upon order by the municipality.

2. Alternatives and Recommendations

The Maine State Plumbing Code is protective of the environment through proper design and installation of subsurface sewage disposal systems. Alternatives considered to improve the effectiveness of the Code include improved State and local enforcement, mandatory maintenance and inspection, and regionalization of inspection and enforcement programs.

There should be stricter enforcement of the Plumbing Code. This can best be achieved by employment of a full-time, well qualified inspector hired to serve one or more towns. Maintenance should be required by the State and enforced through a local or regional inspection program. A funding program for rehabilitating systems should be investigated, utilizing EPA, Farmers Home Administration, Community Services Administration, and local banks as sources.

C. Impact Assessment

The major issue associated with this waste source is the increased local cost to implement an improved enforcement and inspection program related to the Plumbing Code. This moderate increase in cost will be balanced by improved reliability of subsurface sewage disposal resulting in improved water quality, health, and safety. A regional code enforcement program shared with other towns would cost an estimated $6,300 per year. This cost for maintenance and enforcement of the Plumbing Code could save potential investments in expensive sewage facilities by assuring the reliability and effectiveness of subsurface disposal.

A secondary impact of this action will affect the homeowners with malfunctioning septic systems. Mandatory rehabilitation is expected to cost the homeowner of a malfunctioning system from $20 for pumping to $2,000 for replacement.

Septage Disposal

A. Technical Considerations

1. Existing and Future Conditions

The Wells septage disposal site is located approximately one mile southeast of Route 9 on an access road about one mile west of the intersection of Route 9 and Route 109. The Wells solid waste disposal site may be reached by continuing south on the access road 500 feet.

The septage is disposed of by land application in a field adjacent to the east side of the access road. The application area is approximately 11 acres. On the south side of the disposal site is an infiltration lagoon which is used for septage disposal during winter months. A former infiltrative lagoon which was used year-round until 1975 is located across the access road from the present land application site. There is no pumper charge for septage disposal at the site. Septage is deposited on the site while the pumping truck is stationary. There is no provision for directing the pumpers to a specified portion of the site. No cover crop is harvested from the site.

Soils analysis indicates that most soils on the site are suitable for septage disposal, but the overloading that is presently occurring may result in adverse groundwater quality effects in the immediate vicinity of the site.

The Wells septage and solid waste disposal sites have been monitored for groundwater contamination by the Maine Department of Environmental Protection. Test well No. 4 was found on April 4 to contain 13.8 mg/l total nitrogen and 1,400 fecal coliform per 100 ml. These readings are believed to be caused by the septage lagoon approximately 20 feet away.

On February 24, 1976, well No. 3, approximately 500 feet to the south of the application area, showed a nitrate nitrogen reading of 53 mg/l. None of the other five wells tested showed significant nitrate readings. This could indicate a southerly direction of groundwater flow from the present and former septage disposal areas. The solid waste disposal area may also have contributed to the reading. This monitoring data is sparse and the conclusions drawn are preliminary.

2. Alternatives and Recommendations

The alternatives for septage disposal in the area are: 1) repeated manual land spreading on the same site; 2) recycling through a green manure crop; 3) disposal in trenches, 4) disposal in sanitary landfills; or 5) treatment at a wastewater treatment facility.

It is recommended that additional test wells be placed in the probable flow directions adjacent to the site. Monthly sampling of these wells should be performed. This would further quantify the effect of the high nitrogen loading and determine whether modifications to this disposal method are warranted. It is also recommended that septage be spread more uniformly over various portions of the site. This may be accomplished by allowing the attendant to indicate through some marker the area which is actively being utilized. The marker should be moved to a different portion of the site after a predetermined amount of septage is deposited.

It is estimated that Wells will have a septage generation rate of 805,000 gallons annually in the year 2000. Discussions with the Wells Sanitary District Superintendent revealed that Wells plans to treat septage at its municipal wastewater treatment facility which is currently under construction. The Wells sewage treatment plant should be adequate to treat all of the septage generated in the Town of Wells

throughout the planning period. However, the land disposal site, approved for about 200,000 gallons/year, can undoubtedly handle the septage at a lower cost than at the treatment facility. As long as water pollution problems are not significant, it is suggested that the land disposal site be used to its capacity and the remaining septage treated at the Wells facility.

B. Management Considerations

1. Existing Conditions

The municipality is responsible for providing an approved septage disposal site and operating the site in accordance with State regulations for land disposal of septage. The State regulates the location, application, loading rates, and maintenance of the site to protect the health of the community, and to prevent drinking water contamination. Alternatively, disposal may be accomplished at a sewage treatment plant. The Town has the responsibility to manage the disposal of septage to prevent upsets at the treatment plant and to protect the health and safety of its citizens from the possible hazards of such disposal.

2. Alternatives and Recommendations

The existing management agencies have the requisite authority to properly carry out the task of septage disposal. No management changes are recommended. However, thorough, uniform enforcement of State regulations should be pursued.

C. Impact Assessment

Use of treatment plant facilities as the means for septage disposal is an effective means of processing septage before ultimate disposal on land. Processing of septage in this manner reduces the hazards associated with direct land application of septage. However, the current method of land application is less expensive and with adequate control of application, water quality problems should not be significant.

Sludge Disposal

A. Technical Considerations

1. Existing and Future Conditions

The Town of Wells has received funding for the construction of a wastewater treatment facility scheduled for completion in 1978. Once the treatment plant is operational, a sludge disposal facility will be required. It is estimated that an equivalent annual population of approximately 7,000 persons will be served by the Wells treatment plant in the year 2000. This will result in a volume of approximately 66 cubic yards of sludge per year with an estimated nitrogen content of 100 pounds nitrogen per 15 cubic yards of sludge for an annual nitrogen generation rate of 438 pounds. The treatment of septage as previously discussed would increase the estimated sludge volume and nitrogen load.

2. Alternatives and Recommendations

The Plan has looked at a number of technical alternatives including incineration, composting and land disposal. Wells has several large areas which are suitable from both soils and existing land use considerations for sludge disposal on land.

The most obvious site is the present 11 acre septage disposal site. With an approved nitrogen loading of 150 pounds nitrogen per acre per year, this site would probably not be large enough to accommodate the sludge if septage were treated at the plant.

Another potential sludge disposal site is located to the southeast of the existing site, on the western border of the Maine Turnpike. Approximately 80 acres are mapped with Windsor-Deerfield soils. These soils are recommended for a sludge loading rate of 100 pounds nitrogen per acre per year, for a total land area requirement of 4.5 acres. This site could be utilized as a combined solid waste and sludge disposal site. An on-site investigation is recommended to verify the adequacy of this site for sludge disposal.

B. Management Considerations

1. Existing Conditions

The municipality is responsible for providing an approved sludge disposal site and operating the site in accordance with State regulations for land disposal of sludge. The State regulates the location of the site, application, loading rates, and maintenance of the site to protect the health of the community, and to prevent drinking water contamination.

2. Alternatives and Recommendations

The existing management agencies have the requisite authority to properly carry out the task of sludge disposal. No management changes are recommended. However, thorough uniform enforcement of State regulations should be pursued.

C. Impact Assessment

The general recommendation stated above is to undertake a detailed feasibility study for the anticipated sludge to be generated by the new secondary treatment facility. Applicable disposal alternatives have been identified and assessed in general in the Plan. A more detailed impact assessment will be required once the feasibility study develops a specific recommendation. The Impact Assessment Matrix summarizes the alternatives and generally assesses their impact. This can serve as a guide for the municipality in its evaluation of the alternatives.

Solid Waste Disposal

A. Technical Considerations

1. Present and Future Conditions

In 1971 the Town of Wells began operation of their sanitary landfill in an abandoned borrow pit, located south of Route 9. It consists of 125 acres of land, approximately 5 of which are being used for the

disposal of solid waste. Another portion of the site is being used for the disposal of septage waste. Wells generates a total of 6,000 tons of waste per year, which requires approximately 12,000 cubic yards of landfill. At this rate of generation the Wells site has enough capacity for over 10 years of operation.

The area is operated as a sanitary landfill according to DEP rules and regulations. The refuse is dumped at the top of a small embankment, compacted and covered with a sandy material. Surrounding the dump site are two soil materials: glacial tills and outwashes. To the south and west the soils are generally mapped as AuGres soils. These soils are somewhat poorly drained with water table fluctuating near the surface. To the west of the site Deerfield soils are mapped. These soils are moderately well-drained sandy soils with seasonal water table at one to three feet in depth. To the north of the site Skerry soils are located, which are usually deep and moderately well drained. A perched water table is evident at one and a half to three feet in depth. East of the site are poorly drained Leicester soils with seasonal water table at or near the surface. None of the above soils meet DEP suitability criteria for landfill. Water was noticed at the surface in various places around the landfill site. Reddish leachate was noticed in some of these areas.

2. Alternatives and Recommendations

Every effort should be made to avoid dumping refuse directly into groundwater or ponded water to prevent unnecessary generation of leachate. Excavation of till material at the edges of the present disposal area should be limited in order to maintain adequate depth of soil above the groundwater table.

Additional monitoring should be accomplished to establish the limits of the leachate plume, changes in the strength of the leachate with distance from the disposal site and the effects of the leachate on the vegetation.

A new disposal facility will be required within the planning period. The alternatives discussed in the Plan include: sanitary landfill, baling and shredding, incineration, and incineration with heat recovery. Regional disposal systems have also been evaluated for Kennebunk, Arundel, Kennebunkport, and Wells. Costs have been compared on an individual town basis and with the towns together as a region.

Estimated Annual Solid Waste Disposal Costs - Alternatives

	Annual Generation	Sanitary Landfill	Baling or Shredding	Incineration	Incineration with Heat Recovery
The Region	18,300	$109,800 $6/T	$164,700 $9/T	$292,800 $16/T	$160,125 $8.75/T

Annual generation of solid waste in the Wells - Kennebunk - Kennebunkport - Arundel region is 18,300 tons. Landfill is probably the only acceptable disposal option viable in the region. A regional landfill would cost $6 per ton.

The number of suitable landfill sites in the region is not great, and most of these sites would require a great amount of modification to be environmentally acceptable. This becomes cost-effective only with large disposal volumes. The estimated costs of operating individual and regional landfills is shown below. Although regional landfill is the most cost-effective disposal method available for the towns within the region, transportation costs for most of the towns will increase. This added cost will not be great, however, and will not necessitate the use of transfer stations for transport within the region.

Estimated Annual Solid Waste Disposal Costs - Individual Versus Regional

Municipality	Annual Generation	Sanitary Landfill
Arundel	1,900	$13/T
Kennebunk	7,000	$8.50/T
Kennebunkport	2,800	$11/T
Wells	6,600	$9/T
Region	18,300	$6/T

B. Management Considerations

1. Existing Conditions

The municipality of Wells owns and operates a solid waste disposal site.

2. Alternatives and Recommendations

Wells has the option of continuing to own and operate their disposal facility or joining a regional disposal system. A regional disposal district may be established by a special district or interlocal agreement. The cost estimates for waste disposal support selection of the regional system.

C. Impact Assessment

Although cost estimates indicate that a regional landfill is the most cost-effective method for solid waste disposal in Wells, further study of the political and technical opportunity will be required prior to the development of a firm recommended course of action.

In general, the alternative processing and disposal methods investigated in the plan primarily impact air and water quality. Sanitary landfills, regardless of the solid waste processing method selected, can impact water quality (groundwater and surface water) through generation of leachate. Incineration as a processing method reduces water quality impact while generating potential air quality impacts. Incineration with heat recovery has the same environmental impacts as standard incineration but reduces the economic impact (high cost of incineration) through revenues from sale of steam. Baling and shredding do not reduce water quality impact from

leachate, but rather may provide economic benefit through increased landfill life. Source separation provides benefits through reduction of waste that must be disposed. These impacts are summarized in the Impact Assessment Matrix.

Salt Storage and Application

A. Technical Considerations

1. Existing and Future Conditions

Salt (sodium chloride) is used in Southern Maine to achieve bare pavement conditions during the winter months. Salt will continue to be used as long as the bare pavement policy is mandated and other highway de-icing chemicals are not used because of their prohibitive cost. Surface water quality problems have not been associated with highway de-icing salt uses. However, a small number of individual water supplies have been found to exceed chloride standards.

2. Alternatives and Recommendations

Since use of highway de-icing salt compounds will continue, general guidelines have been presented for the storage, handling and application of these compounds. These guidelines are sensitive to the conflicting policies of bare pavements in winter and clean water and attempt to strike a balance between the two.

B. Management Considerations

1. Existing Conditions

The State and municipalities have the authority and responsibility to maintain roads and highways in the region. The State has established guidelines and procedures for highway de-icing salt storage and application, and has developed educational and training programs for local operators.

2. Alternatives and Recommendations

Existing Maine laws should be investigated for enforcement powers related to regulate the use of highway de-icing compounds. In the absence of enforceable regulations and state level standards adequate to protection of the environment and compatible with policies related to winter driving conditions, MDEP, MDOT and the other agencies should collaborate on their development. This program development should include a series of checks and balances through required reporting, surveillance and/or sampling, and analysis.

C. Impact Assessment

Continued use of highway de-icing salt for road maintenance in the winter months will present a potential threat to surface and groundwater quality. Following recommended practices for storage and application of the salt will minimize the potential for water quality degradation while maintaining bare pavement policy. These practices may tend to increase the costs of providing facilities for salt storage; however, costs may be partially offset by the resulting conservation of salt.

Runoff from Construction Activities

A. Technical Considerations

1. Existing and Future Conditions

Because of the need to remove the cover vegetation and leave areas exposed during many construction projects, the potential for erosion and sedimentation is great. The soil loss can be extensive and can result in significant degradation of surface water through sedimentation and siltation. Since population projections indicate continued growth and development, construction activities will remain a potential source of water pollution.

2. Alternatives and Recommendations

Since erosion and sedimentation in the study area is principally site specific, each situation or occurrence must be considered in relationship to its own setting. The two major factors to be considered in erosion and sediment control are:

a. Reduction of the raindrop impact energy which reduces its dispersing and eroding power below the critical force and

b. Reduction of the velocity of the surface runoff which, in turn, lessens its abrading power and transporting capacity.

Probably the most effective method of reducing the impact energy of raindrops are those procedures which cover the soil; e.g., natural plant cover, mulching, temporary cover crops and paving or covering with non-erodable materials. If the precipitation falling on the site is not allowed to pick up velocity as it runs off then its erosive power is curtailed. Shortening the length of slope is one of the most effective methods of controlling runoff velocities. This shortening can be accomplished by various techniques such as structural measures, cropping or management patterns, or tillage practices.

It is recommended that the most cost-effective manner of instituting methods for controlling runoff from construction activities is through local land use regulatory controls.

B. Management Considerations

1. Existing Conditions

Construction controls are implemented at all levels. The Federal government imposes controls through the Federal Highway Administration, and the Corps' activities. The State imposes controls through the Site Location Law, the Great Ponds Law, the Wetlands Act, Stream Bulldozing, and Mandatory Shoreland Zoning. The Saco River Corridor Commission imposes controls on construction activities. Local controls are imposed through subdivision and zoning regulation.

2. Alternatives and Recommendations

Since the requisite legal authority to regulate construction activities exists, no institutional change is recommended. Municipalities should review, revise, and adopt appropriate versions of the Model Performance Standards for control of runoff and soil loss.

A technical review team should be funded by Federal, State, and local sources to assist the municipality in the establishment of ordinances and in the review of proposed developments.

C. Impact Assessment

The essential purpose of tne recommended ordinances is to minimize the increase of runoff from agricultural lands, attempting to maintain to the extent possible the natural runoff conditions. This action will tend to eliminate storm related discharges to surface waters that may adversely affect water quality.

A secondary impact of the implementation of these ordinances could be increased costs for agricultural activites.

Petroleum Storage and Transfer

A. Technical Considerations

1. Existing and Future Conditions

From the evidence there is no question that petroleum products have the potential to contaminate water resources in the SMRPC 208 area. Furthermore, with the potential for more than 31 million gallons of #2 home heating fuel transferred in over 150,000 transactions and with over 16 million gallons of storage capacity within the 208 area, substantial opportunity for similar oil pollution will continue to exist for the foreseeable future. Assuming little change in present technological and other controls, spills and leaks will likely culminate in local long-term environmental degradation with little or no opportunity for corrective action.

Boating activity (specifically exhaust emissions) may not cause major adverse effects on lakes; however, support facilities (e.g., marinas selling oil and fuel and doing repair work), accidents and negligence in the handling of petroleum products may degrade water quality.

2. Alternatives and Recommendations

This planning effort did not address the large amount of technical control methods for the handling and distribution of petroleum products.

B. Management

1. Existing Conditions

Petroleum storage and transfer are currently managed by Federal, State and local governments. The Federal and State governments primarily regulate water transport, large on-land storage facilities, and discharge to groundwaters and surface waters. Local governments have the

authority to control the siting of oil storage facilities adjacent to water bodies.

2. Alternatives and Recommendations

A State level program designed to identify the magnitude of petroleum related pollution should be developed. Applicable controls should be recommended and incorporated into legislative and regulatory programs. Local and regional input should be sought by the State in the design and implementation of the program.

C. Impact Assessment

As long as substantial volumes of petroleum products are handled, stored, transferred and consumed in the SMRPC 208 area, contamination of water resources is likely to continue. Assuming little change in present technological and management controls, spills and leaks will likely culminate in local long-term environmental degradation with little or no opportunity for corrective action. However, a state level program designed to improve the handling of petroleum products will minimize the potential for petroleum related pollution in Maine.

SOUTHERN MAINE REGIONAL PLANNING COMMISSION
AREAWIDE WASTE TREATMENT MANAGEMENT PLAN

IMPACT ASSESSMENT MATRIX WELLS

LEGEND

- ■ VERY NEGATIVE
- □ NEGATIVE
- □ NO IMPACT
- ■ POSITIVE
- ■ VERY POSITIVE

FACTORS IMPACTED

		TECHNICAL & MANAGEMENT ALTERNATIVES	NATURAL FACTORS: LAND		SURFACE WATERS									GROUNDWATER						AIR				FLORA			FAUNA				CULTURAL FACTORS: LAND USE						Recreation		SOCIAL						ECONOMIC				COST COMPARISON	
			SOIL	UNIQUE PHYSICAL FEATURES	DISSOLVED OXYGEN	BIOLOGICAL OXYGEN DEMAND	SUSPENDED SOLIDS	NUTRIENTS	DRINKING WATER SUPPLY	TEMPERATURE	TURBIDITY	BACTERIA & VIRUSES	Toxic Substances & Heavy Metals	CHLORIDES	NITRATES	PHOSPHATES	HEAVY METALS	BATERIA & VIRUSES	DRINKING WATER SUPPLY	PARTICULATES	NITROGEN OXIDES	SULFUR OXIDES	TOXIC SUBSTANCES	NATURAL VEGETATION	MANAGED VEGETATION	AQUATIC VEGETATION	BIRDS	LAND ANIMALS	FISH & SHELLFISH	FOOD CHAINS	Open Space, Wetlands, Forest	AGRICULTURAL	RESIDENTIAL	COMMERCIAL	INDUSTRIAL	FISHING	WATER RECREATION	POPULATION GROWTH	DEVELOPMENT PATTERN	EMPLOYMENT	HEALTH & SAFETY	INSTITUTIONS	WATER SUPPLY	RECREATION	FISHING	MANUFACTURING	CAPITAL COST	Operation/Maintenance Cost
WASTE SOURCES	SEWAGE DISPOSAL COLLECTION & TREATMENT SYSTEMS	Treatment Alternatives: NO ACTION																																																
		Regional Alternatives																																																
		Sewer Extensions																																																
		Management Alternatives: USE EXISTING AUTHORITY																																																
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	SEWAGE DISPOSAL SUBSURFACE SYSTEMS	Treatment Disposal Systems: SUBSURFACE WASTE DISPOSAL												■		■		■															■					■												
		Treatment Disposal Systems: ALTERNATIVE TOILETS												■		■		■						□																											
		Treatment Disposal Systems: SEWER EXTENSIONS												■		■		■															■					■													
		Management Alternatives: USE EXISTING AUTHORITY																																																
		Management Alternatives: STRICT CODE ENFORCEMENT												■		■		■													□					■														
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	SEPTAGE DISPOSAL	Disposal Methods: NO ACTION	■											■		■																																		
		Disposal Methods: TREATMENT PLANT	■		■	■	■			■	■			■		■																																		
		Disposal Methods: LAND APPLICATION	□																												■		■																	
		Disposal Methods: INCINERATION	■		■	■	■			■	■																																							■
		Management Activities: USE EXISTING AUTHORITY																																																
		Management Activities: REGIONALIZATION																																																■
	SLUDGE DISPOSAL	Disposal Methods: NO ACTION	■											■		■																																		
		Disposal Methods: LAND APPLICATION	□											■		□																																		
		Disposal Methods: INCINERATION	■											■		■																																		■
		Disposal Methods: COMPOSTING	■																					□																										
		Management Alternatives: USE EXISTING AUTHORITY																																																
		Management Alternatives: REGIONALIZATION																																																■
	SOLID WASTE DISPOSAL	Disposal Methods: NO ACTION	■								■			■		■																																		
		Disposal Methods: SOURCE SEPARATION	■								■			■		■																																		
		Disposal Methods: BAILING OR SHREDDING	□								□			■		■																																		
		Disposal Methods: INCINERATION	■								■			■		■																																		
		Disposal Methods: INCINERATION WITH HEAT RECOVERY	■								■			■		■																																		
		Disposal Methods: SANITARY LANDFILL																																																
		Management Alternatives: USE EXISTING AUTHORITY																																																
		Management Alternatives: REGIONALIZATION																																																■

WASTE SOURCES ADDRESSED	PRIORITY*
SEWAGE DISPOSAL - COLLECTION AND TREATMENT SYSTEMS	●
SEWAGE DISPOSAL - SUBSURFACE SYSTEMS	⊕
RUNOFF FROM DEVELOPMENT	⊕
SALT STORAGE AND APPLICATION	⊕
RUNOFF FROM CONSTRUCTION ACTIVITIES	⊕
PETROLEUM STORAGE AND TRANSFER	⊕

Sewage Disposal - Collection and Treatment Systems

A. Technical Consideratio s

1. Existing and Future Conditions

The Village of Ogunquit's sewage collection system consists of 8 miles of gravity sewers 6 to 18 inches in diameter, 8,400 feet of force mains, and seven pumping stations. Some of the sewers have been replaced recently but stormwater is still being discharged through catch basins connected with the system in some areas. A winter population of 1,600 and summer population of 7,500 are served by the collection and treatment system.

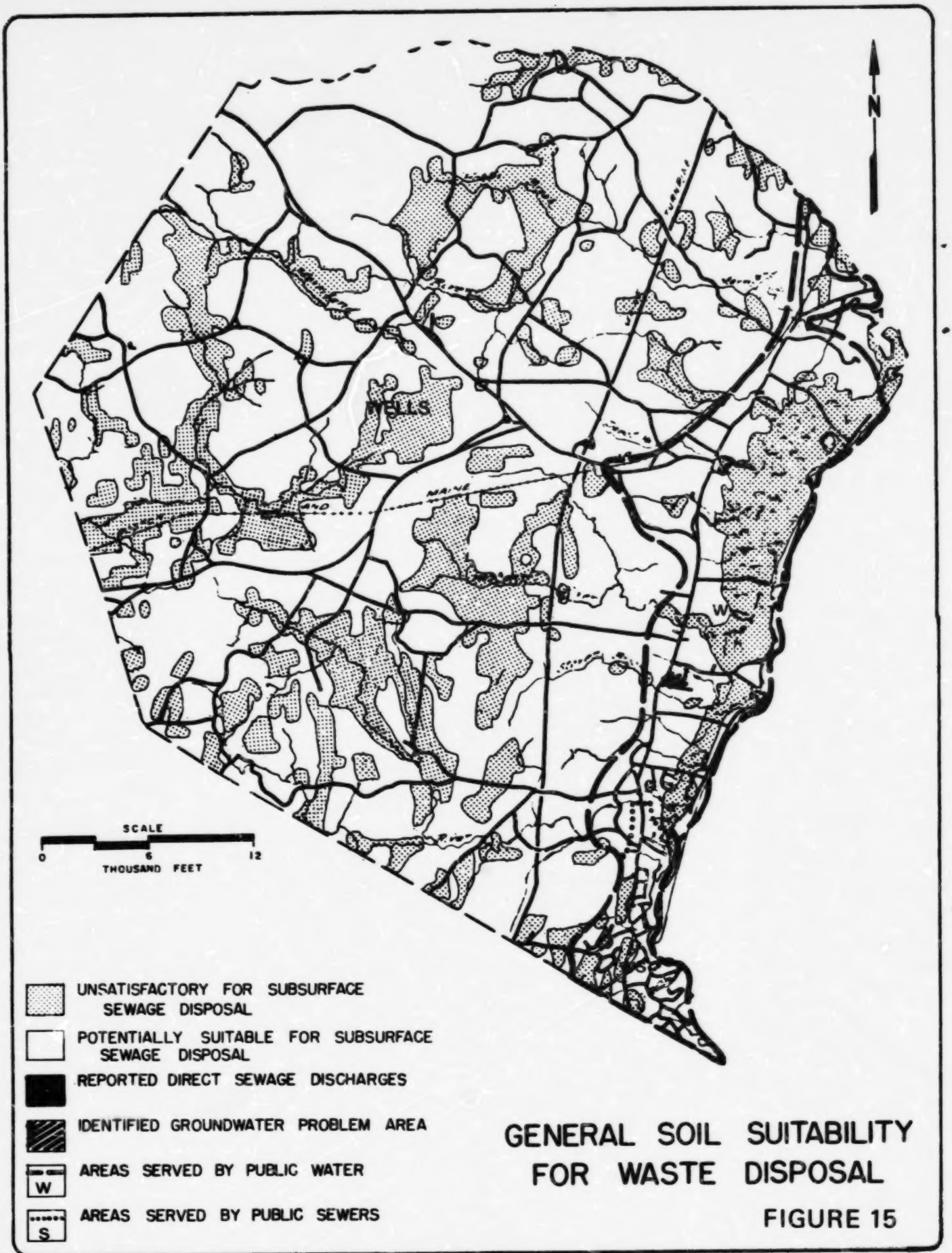
A number of extensions have been made since the original system was built, but there do not appear to be any present intentions, or needs, to extend sewer lines to many new areas in the near future.

Ogunquit's wastewater treatment plant, operational since 1965 and licensed by EPA permit No. ME0100986 and Maine permit No. 449, employs the extended aeration process. Unit operations and processes include: grit removal, screening, aeration, final clarification, and chlorination before discharge to the Ogunquit River, a class SB-2 waterway.

The Plant is designed to treat an average flow of 0.75 mgd (peak summer design flow). Flows during the summer season (July and August) average about 0.37 mgd while the average daily flow during the other ten months is 0.34 mgd. Peak flow rates have been recorded as high as 1.2 mgd. The treatment plant services a predominantly separate collection system; however, the plant receives significant quantities of infiltration. This is why the non-summer average daily flows are high (215 gpcd) compared to the summer flows. There are no major industrial users.

The Ogunquit River, a Class B-2 stream in the freshwater portions and Class SB-2 in the tidal reach, rises in the northeast corner of South

*● PRIORITY ⊕ LOW PRIORITY



GENERAL SOIL SUITABILITY FOR WASTE DISPOSAL

FIGURE 15

Berwick and flows easterly to the coast and then south along Ogunquit Beach to the Atlantic Ocean. The only major point source discharge to the Ogunquit River is from the extended aeration treatment plant which serves the Ogunquit Village area. The treatment plant outfall is located about one mile north of the river mouth.

The Department of Marine Resources has collected data on dissolved oxygen, total coliforms, and fecal coliforms from shellfishing areas in the Ogunquit River estuary. One sample taken in November 1974 indicated a presumptive coliform count of 93 per 100 ml for the estuary, which exceeded the acceptable limit of 70/100 ml for harvesting of shellfish. DMR's 1974 report stated that the river has an excellent population of clams although the river remains closed to shellfishing because of the municipal treatment plant. More recently the clam flats have been opened because of improvements in operation of the plant.

2. Alternatives and Recommendations

High priority needs with regard to the collection system in Ogunquit Village are to reduce infiltration and inflow. As noted earlier, the average daily per capita flow during the non-summer season is 215 gallons. Since average daily water usage in the Kennebunk, Kennebunkport, Wells Water District is only 70 gpcd, approximately two-thirds of the wastewater treated is "clean" water (infiltration). The Sewer District recognizes the infiltration problem and is gradually eliminating high infiltration areas as District funds allow. The District should try to appropriate money each year for the purpose of conducting a sewer system evaluation survey on a portion of the collection system identified as having high infiltration to reduce the infiltration to a cost-effective level.

Expansion of the collection system appears to be a low priority need in the near-term future (to 1985). However, the population projections indicate an additional 1,450 persons could reside in Ogunquit Village by the year 2000. With adequate size lots (1 acre or more), and adherence to the State plumbing code it is possible to accommodate most of this growth with on-site sewage disposal systems.

It should be noted that future extensions of the collection system will remain a <u>local</u> decision. Downstream capacities of sewer lines and pump stations should be determined before development is considered. Eight-inch sewers laid at minimum grade generally have capacity for about 1,200 persons. It is probable that the capacity of the pumping stations could be the limiting factor if significant expansion of the collection system occurred.

Based on population projections and the low priority need to expand the collection system, it appears that the Ogunquit treatment facility will have adequate capacity to handle flows through the year 2000.

By 1985, the treatment facility will have been in operation for 20 years. The useful life of many components of treatment plants is generally about 20 years. Thus, by 1985 there may be a need for extensive repair or replacement of components. To meet this need the Sewer District should try to schedule, when funds allow, repairs and replacement of major worn components (or budget funds over a 2 or 3 year period in anticipation of making a major repair) on an annual basis rather than to have to replace

many components all at once. This is particularly true if separate treatment facilities are desired by both Wells and Ogunquit. (One could defer some major repairs or replacement--as long as the plant remained functional--if it were possible to tie in to the Wells Sanitary District at a future date).

Although separate facilities are desired now, the possibitity of a joint treatment facility in the future should not be ruled out. One alternative is for Ogunquit to utilize its facility to hold wastewater flows from Ogunquit and then to pump the waste to the Wells system during the late evening and early morning hours. The proposed 15-inch sewer at the intersection of Bourne and Ocean Avenues has a capacity of 1.6 mgd which is adequate to handle all of Ogunquit's flow if pumped during these off hours. About 3,000 feet of force main would be required to connect to the Wells system. It is probable that the Wells treatment facility would have sufficient capacity to treat wastewater from both areas until the year 1990 based on today's projections. However, if around the year 1985, this alternative appears to be feasible, that is Wells is willing to accept Ogunquit's wastewater, has adequate capacity, and a cost analysis shows that the cost to repair and operate Ogunquit's facility is more than the regional approach, then the Ogunquit Sewer District should pursue the regional approach to the wastewater management.

Summary of Recommendations

The Ogunquit Sewer District should continue with their program of reducing the amount of infiltration/inflow to a cost-effective level. Consideration should also be given to providing emergency power generation facilities at the two main pump stations in the system. Although Ogunquit and Wells will have separate treatment facilities in the near-term future, consideration should be given to joint use of the Wells facility in the longer-term future.

If it is desired to minimize the need for expansion of the collection systems, measures must be taken to insure that new development takes place on land suitable for on-site wastewater disposal. Increasing the minimum lot size to at least one acre where there are no public sewers and adoption of Appendix 1 of the State Plumbing Code (A Guide for Minimum Lot Size Determination for Single Family Dwellings When On-Site Waste Disposal is Required) would help to reduce the need for future public investment in wastewater collection-treatment facilities.

B. Management Considerations

1. Existing Conditions

The Ogunquit Sewer District owns and operates the wastewater collection and treatment system in the Village.

2. Alternatives and Recommendations

The following management methods were considered and discussed in the management section of the 208 Plan.

a. One single regional sewer district
b. County management of all facilities
c. Management by watershed
d. Management by sewer district for each population center
e. No change in the institutional arrangements

Although a single regional sewer district, county management, or other areawide/regional management agency would tend to reduce overall administrative costs and improve consistency in the provision of collection and treatment services, the establishment of such new agencies requires extensive, new legislative and institutional frameworks. Consequently implementation of a new authority may require a long period of time. Also, individual towns would have a reduced ability for self-determination regarding a town's desires for municipal services and population growth.

The analysis of these potential management agencies resulted in the conclusion that the existing cities, towns, and sewer districts have the authority to design, construct, and manage wastewater collection and treatment facilities. In addition, by minimizing institutional changes, the existing agencies and officials that have participated in the development of the Plan will likewise participate in the immediate implementation of the Plan. Therefore, existing management agencies should continue to design, construct, and manage wastewater collection and treatment systems.

C. Impact Assessment

The Ogunquit wastewater collection and treatment system has been in operation for 15 years. Reduction of infiltration and inflow as recommended will increase capacity and efficiency of the treatment facility. With proper operation and adequate maintenance, the water quality classification of Ogunquit River should be met and the clam flats remain opened.

Sewage Disposal - Subsurface Systems

A. Technical Considerations

1. Present and Future Conditions

No specific problem areas with respect to subsurface sewage disposal have been identified by Town officials, although soil conditions in some areas suggest that the potential for problems does exist.

2. Alternatives and Recommendations

Subsurface sewage disposal must remain as the major treatment and disposal method for domestic sewage wastes for rural or unsewered areas in the 208 region (cost of public sewers in these areas is prohibitive). Where problems have been defined, sewer service has been evaluated as an alternative to subsurface sewage disposal systems (see Sewage Disposal - Collection and Treatment Systems). Additionally, alternative toilet systems may be used to reduce the potential impact of sewage wastes on soils and groundwater.

In order to minimize future extensions of the wastewater collection system in the future, the Town should consider adopting Appendix 1 of the State Plumbing Code (which provides guidelines for minimum lot sizes where on-site systems are used--this is not a regulation) as part of the zoning ordinance.

B. Management Considerations

1. Existing Conditions

Each town presently regulates subsurface waste disposal in accordance with the State Plumbing Code. Each town has its own Local Plumbing Inspector (usually part-time) who is responsible for issuing permits and enforcing the Code. Soils analysis is done by State certified soil investigators. They submit soils reports to the Plumbing Inspector and the State Department of Human Services. Maintenance is the individual's responsibility; however, there is no legal requirement for maintenance or inspection of systems after installation.

Malfunctioning sewage disposal systems are declared by law to be a nuisance and must be abated upon order by the municipality.

2. Alternatives and Recommendations

The Maine State Plumbing Code is protective of the environment through proper design and installation of subsurface sewage disposal systems.

Alternatives considered to improve the effectiveness of the Code include improved State and local enforcement, mandatory maintenance and inspection, and regionalization of inspection and enforcement programs.

There should be stricter enforcement of the Plumbing Code. This can best be achieved by employment of a full-time, well qualified inspector hired to serve one or more towns. Maintenance should be required by the State and enforced through a local or regional inspection program. A funding program for rehabilitating systems should be investigated, utilizing EPA, Farmers Home Administration, Community Services Administration, and local banks as sources.

C. Impact Assessment

The major issue associated with this waste source is the increased local cost to implement an improved enforcement and inspection program related to the Plumbing Code. This moderate increase in cost will be balanced by improved reliability of subsurface sewage disposal resulting in improved water quality, health, and safety. This cost for maintenance and enforcement of the Plumbing Code could save potential investments in expensive sewage facilities by assuring the reliability and effectiveness of subsurface disposal.

A secondary impact of this action will affect the homeowners with malfunctioning septic systems. Mandatory rehabilitation is expected to cost the homeowner of a malfunctioning system from $20 for pumping to $2,000 for replacement.

Runoff from Development

A. Technical Considerations

1. Existing and Future Conditions

The Ogunquit wastewater collection system has been separated to the extent that bypasses at the treatment facility or at upstream pump stations now occur only as a result of mechanical or power failure.

The developed areas in both Ogunquit and Wells in the table below, have been differentiated geographically. For each area the "rational method" has been applied in order to calculate the volume of rainfall from a typical storm event of the intensity and duration that occurs on the average once-a-week-storm.

STORMWATER RUNOFF PER WEEKLY STORM EVENT

Developed Area	Drainage Area (Acres)	Volume/Storm (MG)	Receiving Waters
Ogunquit	220	0.96	Josias River - Atlantic Ocean
	540	2.35	Ogunquit River
Wells	530.8	2.29	Webhannet River
Charles Chase Corner Area	275	1.20	Ogunquit River
Moody-Wells Beaches	340	1.46	Atlantic Ocean
Drakes Island Beach	80	0.35	Atlantic Ocean

The concentration of pollutants which are currently being contributed to the receiving waters--on a weekly basis--as a result of stormwater runoff are shown in the following table. It should be noted, in both tables (above and below), that because of the presence of combined sewers in Ogunquit Village the runoff volumes estimated there may, in reality, be somewhat lower because of the interception of runoff by these sewers and subsequent transport of these intercepted volumes to the treatment plant.

LOADINGS PER WEEKLY STORM EVENT

Receiving Waters	BOD (lbs)	SS (lbs)	Total N (lbs)	Total P (lbs)	Fecal Coliform (MPN)
Ogunquit River	890	18,600	9	3	5.36×10^{12}
Webhannet River	575	12,000	6	2	3.46×10^{12}
Atlantic Ocean	695	14,600	7	2	4.18×10^{12}

2. Alternatives and Recommendations

Before any urban stormwater management controls are instituted, it appears that it would be beneficial to see what effect the construction of the Wells collection - treatment facilities has on the quality of Ogunquit and Webhannet Rivers, particularly coliform bacteria. The Ogunquit River estuary reportedly has an excellent population of clams but has been closed in the past to shellfishing because of high coliform counts. Many of the present non-sewered areas in the Wells Sanitary District drain to the Ogunquit River and could be the major source of coliform bacteria. Stormwater runoff can also contain significant amounts of coliform bacteria; however, capital intensive measures to control stormwater from Route 95 east to the Atlantic Ocean should be delayed until after the Wells system is operational or until such time as it can be shown, by sampling of stormwater and the river, that stormwater is the source of high coliform bacteria.

B. Management Considerations

1. Existing Condicions

The primary responsibility for controlling storm water runoff rests with the municipality.

2. Alternatives and Recommendations

Runoff from development can be limited by local codes and ordinances such as subdivision regulations and zoning ordinance performance standards. Additionally, the State Site Location Law requires erosion and sediment control plans for new development. The existing management agencies have adequate authority to control runoff. The Town has the authority to regulate the use of land to limit runoff and the local treatment authority has the power to control collected runoff. Therefore, no institutional changes are recommended. However, to improve controls to limit runoff municipalities are urged to review, modify and adopt the model subdivision regulations and zoning ordinance performance standards included in the Plan.

A technical review team should be funded through federal, state, and local sources, to assist the municipality in establishing ordinances and in the review of proposed developments.

C. Impact Assessment

The essential purpose of the recommended ordinances is to minimize the increase of runoff from developed lands, attempting to maintain to the extent possible the natural runoff conditions. This action will tend to eliminate storm related discharges to surface waters and reduce the potential for flooding. Controlling stormwater runoff at the source will decrease the demand for expensive collection and transport facilities.

A secondary impact of the implementation of the ordinances will be increased land development costs.

Salt Storage and Application

A. Technical Considerations

1. Existing and Future Conditions

Salt (sodium chloride) is used in Southern Maine to achieve bare pavement conditions during the winter months. Salt will continue to be used as long as the bare pavement policy is mandated and other highway de-icing chemicals are not used because of their prohibitive cost. Surface water quality problems have not been associated with highway de-icing salt uses. However, a small number of individual water supplies have been found to exceed chloride standards.

2. Alternatives and Recommendations

Since use of highway de-icing salt compounds will continue, general guidelines have been presented for the storage, handling and application of these compounds. These guidelines are sensitive to the conflicting policies of bare pavements in winter and clean water and attempt to strike a balance between the two.

B. Management Considerations

1. Existing Conditions

The State and municipalities have the authority and responsibility to maintain roads and highways in the region. The State has established guidelines and procedures for highway de-icing salt storage and application, and has developed educational and training programs for local operators.

2. Alternatives and Recommendations

Existing Maine laws should be investigated for enforcement powers related to regulate the use of highway de-icing compounds. In the absence of enforceable regulations and state level standards adequate to protection of the environment and compatible with policies related to winter driving conditions, MDEP, MDOT and the other agencies should collaborate on their development. This program development should include a series of checks and balances through required reporting, surveillance and/or sampling, and analysis.

C. Impact Assessment

Continued use of highway de-icing salt for road maintenance in the winter months will present a potential threat to surface and groundwater quality. Following recommended practices for storage and application of the salt will minimize the potential for water quality degradation while maintaining bare pavement policy. These practices may tend to increase the costs of providing facilities for salt storage; however, costs may be partially offset by the resulting conservation of salt.

Runoff from Construction Activities

A. Technical Considerations

1. Existing and Future Conditions

Because of the need to remove the cover vegetation and leave areas exposed during many construction projects, the potential for erosion and sedimentation is great. The soil loss can be extensive and can result in significant degradation of surface water through sedimentation and siltation. Since population projections indicate continued growth and development, construction activities will remain a potential source of water pollution.

2. Alternatives and Recommendations

Since erosion and sedimentation in the study area is principally site specific, each situation or occurrence must be considered in relationship to its own setting. The two major factors to be considered in erosion and sediment control are:

a. Reduction of the raindrop impact energy which reduces its dispersing and eroding power below the critical force and

b. Reduction of the velocity of the surface runoff which, in turn, lessens its abrading power and transporting capacity.

Probably the most effective method of reducing the impact energy of raindrops are those procedures which cover the soil; e.g., natural plant cover, mulching, temporary cover crops and paving or covering with non-erodable materials. If the precipitation falling on the site is not allowed to pick up velocity as it runs off then its erosive power is curtailed. Shortening the length of slope is one of the most effective methods of controlling runoff velocities. This shortening can be accomplished by various techniques such as structural measures, cropping or management patterns, or tillage practices.

It is recommended that the most cost-effective manner of instituting methods for controlling runoff from construction activities is through local land use regulatory controls.

B. Management Considerations

1. Existing Conditions

Construction controls are implemented at all levels. The Federal government imposes controls through the Federal Highway Administration, and the Corps' activities. The State imposes controls through the Site Location Law, the Great Ponds Law, the Wetlands Act, Stream Bulldozing, and Mandatory Shoreland Zoning. The Saco River Corridor Commission imposes controls on construction activities. Local controls are imposed through subdivision and zoning regulation.

2. Alternatives and Recommendations

Since the requisite legal authority to regulate construction activities exists, no institutional change is recommended. Municipalities should review, revise, and adopt appropriate versions of the Model Performance Standards for control of runoff and soil loss.

A technical review team should be funded by Federal, State, and local sources to assist the municipality in the establishment of ordinances and in the review of proposed developments.

C. Impact Assessment

The essential purpose of the recommneded ordinances is to minimize the increase of runoff from agricultural lands, attempting to maintain to the extent possible the natural runoff conditions. This action will tend to eliminate storm related discharges to surface waters that may adversely affect water quality.

A secondary impact of the implementation of these ordinances could be increased costs for agricultural activities.

Petroleum Storage and Transfer

A. Technical Considerations

1. Existing and Future Conditions

From the evidence there is no question that petroleum products have the potential to contaminate water resources in the SMRPC 208 area. Furthermore, with the potential for more than 31 million gallons of #2 home heating fuel transferred in over 150,000 transactions and with over 16 million gallons of storage capacity within the 208 area, substantial opportunity for similar oil pollution will continue to exist for the foreseeable future. Assuming little change in present technological and other controls, spills and leaks will likely culminate in local long-term environmental degradation with little or no opportunity for corrective action.

Boating activity (specifically exhaust emissions) may not cause major adverse effects on lakes; however, support facilities (e.g., marinas selling oil and fuel and doing repair work), accidents, and negligence in the handling of petroleum products may degrade water quality.

2. Alternatives and Recommendations

This planning effort did not address the large amount of technical control methods for the handling and distribution of petroleum products.

B. Management

1. Existing Conditions

Petroleum storage and transfer are currently managed by Federal, State and local governments. The Federal and State governments primarily regulate water transport, large on-land storage facilities, and discharge to groundwaters and surface waters. Local governments have the authority to control the siting of oil storage facilities adjacent to water bodies.

2. Alternatives and Recommendations

A State level program designed to identify the magnitude of petroleum related pollution should be developed. Applicable controls should be recommended and incorporated into legislative and regulatory programs.

Local and regional input should be sought by the State in the design and implementation of the program.

C. Impact Assessment

As long as substantial volumes of petroleum products are handled, stored, transferred and consumed in the SMRPC 208 area, contamination of water resources is likely to continue. Assuming little change in present technological and management controls, spills and leaks will likely culminate in local long-term environmental degradation with little or no opportunity for corrective action. However, a state level program designed to improve the handling of petroleum products will minimize the potential for petroleum related pollution in Maine.

YORK

WASTE SOURCES ADDRESSED	PRIORITY *
SEWAGE DISPOSAL - COLLECTION AND TREATMENT SYSTEMS	⊕
SEWAGE DISPOSAL - SUBSURFACE SYSTEMS	●
SOLID WASTE DISPOSAL	●
RUNOFF FROM DEVELOPMENT	⊕
RUNOFF FROM AGRICULTURE	⊕
SALT STORAGE AND APPLICATION	⊕
RUNOFF FROM CONSTRUCTION ACTIVITIES	⊕
PETROLEUM STORAGE AND TRANSFER	⊕

Sewage Disposal - Collection and Treatment Systems

A. Technical Considerations

1. Existing and Future Conditions

The sewage collection system serving the coastal area of York presently consists of 9 - 10 miles of gravity sewers with diameters of from 6 to 18 inches, about 1.6 miles of force mains, and the Long Beach interceptor which is about 3 miles long with diameters ranging from 15 to 30 inches. Except for the connection of three known catch basins or stormwater inlets to the sewers, the system is essentially separate. About six miles of sewers in the older parts of the system were constructed 60 - 70 years ago, generally of clay pipe, and infiltration problems therefore do exist in some areas.

The existing collector sewer system serves about 3,000 permanent residents out of the town's year-round population of about 7,000 and 6,000 summer residents, according to estimates made in 1975. Current figures are likely to be slightly higher.

The major deficiency in the York Sewer District system, soon to be corrected by construction of the York Harbor interceptor, is the existence of numerous direct discharges of untreated sewage to the York River estuary from small sewers along the shore of York Harbor.

Preliminary findings of the nonpoint source consultant indicate that coliform levels at the mouth of the York River are higher than at other points along the York coast and may be attributable to the raw waste discharges as well as urban runoff.

Only the landward portion of Cape Neddick is presently served by the wastewater collection system. Problems reportedly exist with subsurface disposal systems on the eastern half of the Cape, due primarily

* ● PRIORITY ⊕ LOW PRIORITY

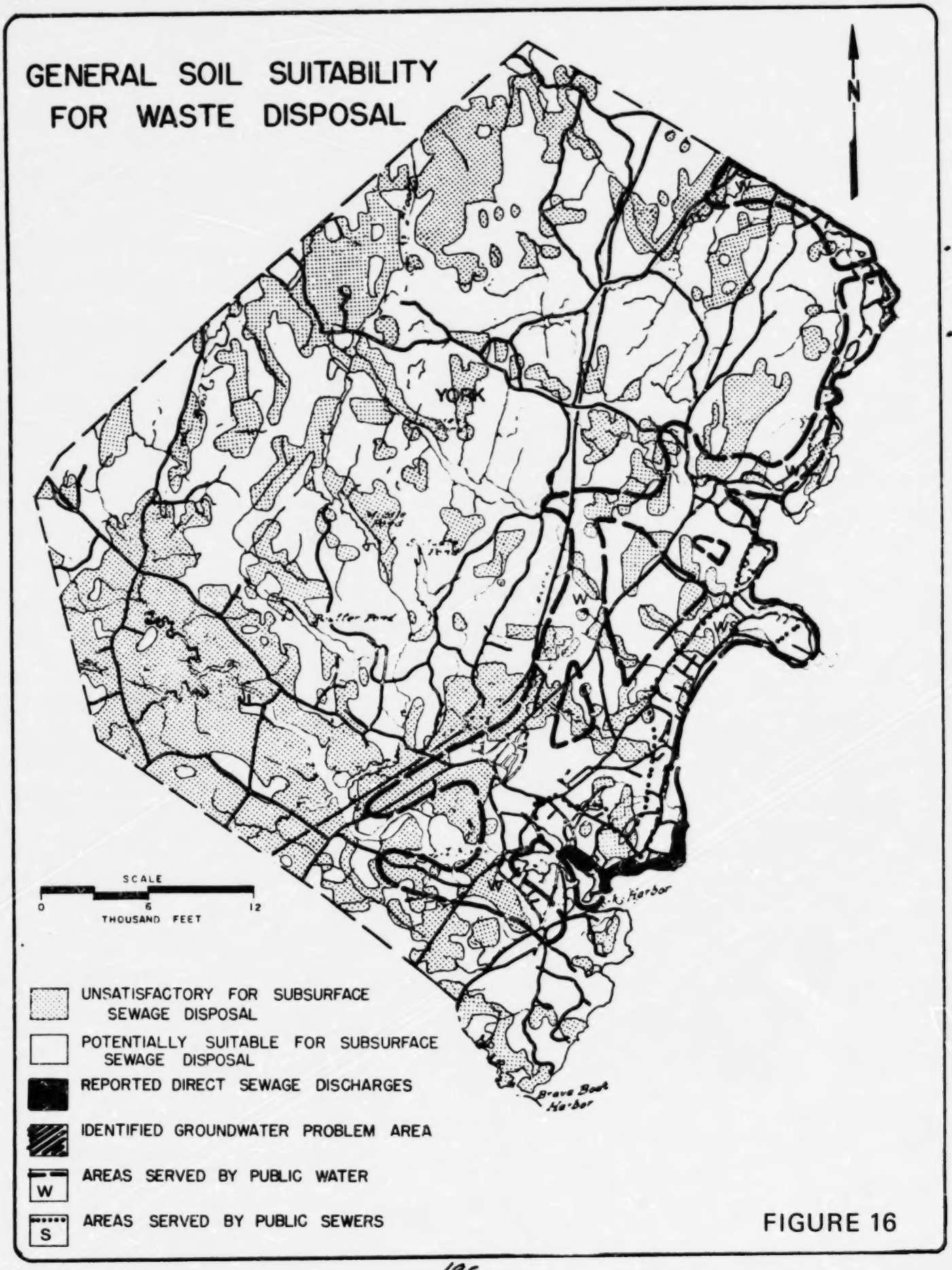

GENERAL SOIL SUITABILITY
FOR WASTE DISPOSAL
N
YORK
SCALE
0
6
12
THOUSAND FEET
UNSATISFACTORY FOR SUBSURFACE SEWAGE DISPOSAL
POTENTIALLY SUITABLE FOR SUBSURFACE SEWAGE DISPOSAL
REPORTED DIRECT SEWAGE DISCHARGES
IDENTIFIED GROUNDWATER PROBLEM AREA
AREAS SERVED BY PUBLIC WATER
W
AREAS SERVED BY PUBLIC SEWERS
S

FIGURE 16

to the high ledge conditions encountered there. Although it has not been demonstrated that any significant bacterial contamination results from subsurface disposal systems in this area, public sewerage may be warranted from the standpoint of eliminating experienced difficultites in operation of individual systems.

Presently the coastal area in the northern part of town is sparsely developed with homes on large lots which are generally adequate for subsurface disposal of wastewater. Therefore, the area is not considered to have existing sewerage needs.

York's secondary wastewater treatment facility, licensed by NPDES permit No. ME0101222 and Maine waste discharge license No. 475, has been operational since 1975. Unit operations and processes include: grit removal, aeration, final clarification, and chlorination. The effluent is discharged via a long outfall to the Atlantic Ocean at the mouth of the Cape Neddick River. The outfall extends 1,600 feet out into the ocean. The sludge, about 450 cubic yards annually (dewatered), is stabilized by aerobic digestion and dewatered by a centrifuge before composting and used as a soil conditioner. The facility is designed to treat an average flow of 1.6 mgd; actual flows average about 0.53 mgd. Springtime average flows are slightly higher than summer flows during the height of the tourist season. The plant services some combined sewer. As a result peak daily flows have reached 2.1 mgd. There are no major industrial users but the plant treats about 21,000 gallons per month of septage.

The principal source of coastal water pollution in the Cape Neddick area is the Town's sewage treatment plant outfall near Barn Point. But because of improved facilities at this plant and lowered bacterial counts a portion of a previously closed shellfishing area has recently been opened.

2. Alternatives and Recommendations

After construction of the Barrells Mills Pond and York Harbor interceptor it would appear that the only major area requiring public sewers in the near-term future is the Cape Neddick Nubble. Estimated cost of 24,000 feet of sewer and pump stations to service this area is $1,200,000. Additional extensions along the coast and westerly toward Route 1 should be made as needed, that is to prevent health hazard or serious water pollution problems. Adoption of Appendix 1 of the State Plumbing Code, "A Guide for Minimum Lot Size Determination for Single Family Dwelling When On-Site Disposal is Required", coupled with zoning regulations which reflect the capability of the soil to handle on-site systems in non-sewered areas is essential to minimizing future public investment in wastewater treatment - collection facilities.

The Sewer District should periodically evaluate the extent of infiltration in the wastewater collection system in the springtime at key manholes, particularly in the older sections of the sewerage system. The purpose of this is to determine whether it is less costly to treat the infiltration or to reduce the infiltration by rehabilitation or replacement of sewers. The infiltration/inflow (I/I) analysis con-

ducted for the Sewer District in 1975 indicated a sewer system evaluation survey should be conducted on sewers in the Barrells Mill Pond and Woodbridge Road area. At this time it is cost-effective to treat the present level of infiltration from other areas of the District. It is also recommended to eliminate three points of inflow identified in the I/I report. Since the only recent bypass event occurring at the treatment plant was during Hurricane Belle, elimination of these inflow points would practically eliminate stormwater related bypasses at the treatment facility.

B. Management Consideration

1. Existing Conditions

The York Sewer District owns and operates the wastewater collection and treatment system in the Town of York.

2. Alternatives and Recommendations

The following management methods were considered and discussed in the management section of the 208 plan.

a. One single regional sewer district
b. County management of all facilities
c. Management by watershed
d. Management by sewer district for each population center
e. No change in the institutional arrangements

Although a single regional sewer district, county management, or other areawide/regional management agency would tend to reduce overall administrative costs and improve consistency in the provision of collection and treatment services, the establishment of such new agencies requires extensive, new legislative and institutional frameworks. Consequently implementation of a new authority may require a long period of time. Also, individual towns would have a reduced ability for self-determination regarding a town's desires for municipal services and population growth.

The analysis of these potential management agencies resulted in the conclusion that the existing cities, towns, and sewer districts have the authority to design, construct, and manage wastewater collection and treatment facilities. In addition, by minimizing institutional changes, the existing agencies and officials that have participated in the development of the Plan will likewise participate in the immediate implementation of the Plan. Therefore, existing management agencies should continue to design, construct, and manage wastewater collection and treatment systems.

C. Impact Assessment

Construction of sewers for the Cape Neddick Nubble will eliminate a number of malfunctioning subsurface sewage disposal systems. This will contribute to the maintenance of the water quality along Long Sands Beach, a major water recreational area in Maine.

Sewage Disposal - Subsurface Systems

A. Technical Considerations

1. Existing and Future Conditions

Private on-lot septic tank systems are used throughout the Town of York except in the sewered coastal area between the York and Cape Neddick Rivers. Several raw sewage outfalls along the north shore of York Harbor will be eliminated by construction of the York Harbor interceptor. Problems with subsurface sewage disposal systems are known to occur in some areas, particularly on unsewered portions of Cape Neddick, and in the southwestern part of town between South Berwick Road and the Kittery - York border areas.

2. Alternatives and Recommendations

Subsurface sewage disposal must remain as the major treatment and disposal method for domestic sewage wastes for rural or unsewered areas in the 208 region (cost of public sewers in these areas is prohibitive). Where problems have been defined, sewer service has been evaluated as an alternative to subsurface sewage disposal systems (see Sewage Disposal - Collection and Treatment Systems). Additionally, alternative toilet systems may be used to reduce the potential impact of sewage wastes on soils and groundwater.

In order to minimize future extensions of the wastewater collection system in the future, the Town should consider adopting Appendix 1 of the State Plumbing Code (which provides guidelines for minimum lot sizes where on-site systems are used--this is not a regulation) as part of the zoning ordinance.

B. Management Considerations

1. Existing Conditions

Each town presently regulates subsurface waste disposal in accordance with the State Plumbing Code. Each town has its own Local Plumbing Inspector (usually part-time) who is responsible for issuing permits and enforcing the Code. Soils analysis is done by State certified soil investigators. They submit soils reports to the Plumbing Inspector and the State Department of Human Services. Maintenance is the individual's responsibility; however, there is no legal requirement for maintenance or inspection of systems after installation.

Malfunctioning sewage disposal systems are declared by law to be a nuisance and must be abated upon order by the municipality.

2. Alternatives and Recommendations

The Maine State Plumbing Code is protective of the environment through proper design and installation of subsurface sewage disposal systems. Alternatives considered to improve the effectiveness of the Code include improved State and local enforcement, mandatory maintenance and inspection, and regionalization of inspection and enforcement programs.

There should be stricter enforcement of the Plumbing Code. This can best be achieved by employment of a full-time, well qualified inspector

hired to serve one or more towns. Maintenance should be required by the State and enforced through a local or regional inspection program. A funding program for rehabilitating systems should be investigated, utilizing EPA, Farmers Home Administration, Community Services Administration, and local banks as sources.

C. Impact Assessment

The major issue associated with this waste source is the increased local cost to implement an improved enforcement and inspection program related to the Plumbing Code. This moderate increase in cost will be balanced by improved reliability of subsurface sewage disposal resulting in improved water quality, health, and safety. A regional code enforcement program shared with Wells and South Berwick would cost an estimated $22,383 per year. This cost for maintenance and enforcement of the Plumbing Code could save potential investments in expensive sewage facilities by assuring the reliability and effectiveness of subsurface disposal.

A secondary impact of this action will affect the homeowners with malfunctioning septic systems. Mandatory rehabilitation is expected to cost the homeowner of a malfunctioning system from $20 to $2,000 for replacement.

Solid Waste Disposal

A. Technical Considerations

1. Existing and Future Conditions

York's solid waste disposal site is located south of the Agamenticus Road, just to the east of the Maine Turnpike. It is highly visible from the turnpike. The site has been operated as an open burning dump since 1953. Its capacity has essentially been exhausted, and the site is unsuitable for conversion to landfill.

The Town of York is under pressure from the Environmental Protection Agency to cease the burning operations at the disposal site. The town has withdrawn as a member of the York County Disposal District which attempted to find a regional landfill site for the member towns. York has undertaken steps to acquire a landfill site for its own use on Route 91.

The proposed site has been approved by the BEP with conditions. The conditions include additional plans for water sampling.

2. Alternatives and Recommendations

The proposed site, even with the recommended modifications, is marginally acceptable for solid waste disposal according to suitability criteria. The need for a detailed groundwater monitoring program to evaluate the impact of solid waste disposal at this site cannot be over-emphasized. In establishing a monitoring program, it is suggested that levels of contaminants be specified for the samples, above which corrective measures must be identified and implemented. Additionally, the MacIntire-Junkins Brook should be sampled as often as the monitoring wells.

The engineering report suggests that if the initial operational area (northern 10 acres) is causing significant impact on MacIntire-Junkins Brook because of leachate migration, then base preparation in the second phase area would have to be modified by bringing in off-site materials with improved ion-exchange capacity. Hence, second phase base preparation and subsequent operation is dependent on the success of the initial phase operation in terms of minimizing leachate problems. Therefore, approval of the expansion of the disposal operation to the second phase area should be contigent on the demonstrated adequacy of leachate control in the initial operational area, and the suitability of selected materials off-site if such materials are necessary.

The estimated lifetime of the proposed landfill is sufficient to accommodate York's solid waste disposal needs for the planning period, as long as significant water quality problems do not develop.

B. Management Considerations

1. Existing Conditions

The municipality of York owns and operates a solid waste disposal site.

2. Alternatives and Recommendations

York has the option of continuing to own and operate their disposal facility or joining a regional disposal system. York has decided to operate a facility in the town exclusively for its own use.

C. Impact Assessment

The closing of the existing York dump will result in reduced air quality impact from open burning, and reduced water quality impact from leachate generation. Use of the proposed Route 91 site will create a potential water quality threat to MacIntire-Junkins Brook.

Runoff from Development

A. Technical Considerations

1. Existing and Future Conditions

York's sewers are essentially separate sanitary sewers. There are few storm sewers in the Town. Rainfall giving rise to stormwater flows therefore is not generally intercepted by the Town's stormwater system but instead runs off overland.

The Town's developed areas can be divided into two general areas - the York Beach - Cape Neddick area and the York Harbor area (from York Corner to York Harbor and Lobster Cove). For each area the "rational method" has been applied in order to estimate the volume of runoff from a typical storm event of the intensity and duration that occurs, on the average, one a week.

STORMWATER RUNOFF PER WEEKLY STORM EVENT

Urban Area	Drainage Acreage	Volume per Storm	Receiving Waters
York Harbor			
Inland area	390 acres	1.7 MG	York River
Coastal area	290 acres	1.3 MG	Atlantic Ocean
York Beach			
Cape Neddick	1060 acres	4.6 MG	Atlantic Ocean

2. Alternatives and Recommendations

The Village of York Beach apparently has drainage problems in the area north of Route 1. Problems identified include sand clogging of drains and flap valves. Topographic and other constraints apparently preclude the application of simple drainage solutions. This problem should be studied in detail and a drainage plan developed. Data-gathering necessary for the inception of such a study should be given high priority. York has very recently retained an engineering firm to address this problem.

B. Management Considerations

1. Existing Conditions

The primary responsibility for controlling storm water runoff rests with the municipality. However, where combined sewer systems are under management of a sewer district, responsibilities are shared.

2. Alternatives and Recommendations

Runoff from development can be limited by local codes and ordinances such as subdivision regulations and zoning ordinance performance standards. Additionally, the State Site Location Law requires erosion and sediment control plans for new development. The existing management agencies have adequate authority to control runoff. The Town has the authority to regulate the use of land to limit runoff and the local treatment authority has the power to control collected runoff. Therefore, no institutional changes are recommended. However, to improve controls to limit runoff municipalities are urged to review, modify and adopt the model subdivision regulations and zoning ordinance performance standards included in the Plan.

A technical review team should be funded through federal, state, and local sources, to assist the municipality in establishing ordinances and in the review of proposed developments.

C. Impact Assessment

The essential purpose of the recommended ordinances is to minimize the increase of runoff from developed lands, attempting to maintain to the extent possible the natural runoff conditions. This action will tend to eliminate storm related discharges to surface waters and reduce the potential for flooding. Controlling stormwater runoff at the source will decrease the demand for expensive collection and transport facilities.

A secondary impact of the implementation of the ordinances will be increased land development costs.

Runoff from Agriculture

A. Technical Considerations

1. Existing and Future Conditions

The land use/land cover map indicates there are about 30,000 acres in agricultural use in the 208 area (12.9% of the land area). Only 10,000 acres are under intensive farming as cropland, the rest being open pasture or hay fields. The Soil Conservation Service has estimated that 66% of the farms are operated under the guidance of Conservation Plans designed to limit soil loss from the land. Because of this, the erosion and sedimentation problems associated with agricultural land use and the potential water quality impact of runoff from these lands is considered minor for this region.

2. Alternatives and Recommendations

Structural controls to minimize agricultural runoff must be applied on a site specific basis. The Soil Conservation Service's recommended agricultural practices and controls for soil loss developed through Conservation Plans are sufficient to protect water quality in this region. Nonstructural control recommendations are in the Land Use Chapter of the Plan as locally enforced Performance Standards (see Management Considerations below).

B. Management Considerations

1. Existing Conditions

Municipalities have the authority to manage land use controls. The Saco River Corridor Commission manages the land within 1000 feet of the Saco River. Voluntary USDA programs are administered by S.C.S. and A.S.C.S. The federal programs offer technical and financial assistance to farmers to control soil loss.

2. Alternatives and Recommendations

Funding of USDA programs should be continued. Additional money should be channeled into the A.S.C.S. Program and the $2,500 cut-off per project should be raised.

Municipalities should review, revise and adopt appropriate versions of the Model Performance Standards for control of run-off and soil loss. A technical review team should be funded by federal, state, and local sources to assist the municipality in the establishing of ordinances and in the review of proposed developments.

C. Impact Assessment

The essential purpose of the recommended ordinances is to minimize the increase of runoff from agricultural lands attempting to maintain to the extent possible the natural runoff conditions. This action will tend to eliminate storm related discharges to surface waters and reduce the potential for flooding.

A secondary impact of the implementation of these ordinances will be increased costs of agricultural land use.

Salt Storage and Application

A. Technical Considerations

1. Existing and Future Conditions

Salt (sodium chloride) is used in Southern Maine to achieve bare pavement conditions during the winter months. Salt will continue to be used as long as the bare pavement policy is mandated and other highway de-icing chemicals are not used because of their prohibitive cost. Surface water quality problems have not been associated with highway de-icing salt uses. However, a small number of individual water supplies have been found to exceed chloride standards.

2. Alternatives and Recommendations

Since use of highway de-icing salt compounds will continue, general guidelines have been presented for the storage, handling and application of these compounds. These guidelines are sensitive to the conflicting policies of bare pavements in winter and clean water and attempt to strike a balance between the two.

B. Management Considerations

1. Existing Conditions

The State and municipalities have the authority and responsibility to maintain roads and highways in the region. The State has established guidelines and procedures for highway de-icing salt storage and application, and has developed educational and training programs for local operators.

2. Alternatives and Recommendations

Existing Maine laws should be investigated for enforcement powers related to regulate the use of highway de-icing compounds. In the absence of enforceable regulations and state level standards adequate to protection of the environment and compatible with policies related

to winter driving conditions, MDEP, MDOT and the other agencies should collaborate on their development. This program development should include a series of checks and balances through required reporting, surveillance and/or sampling, and analysis.

C. Impact Assessment

Continued use of highway de-icing salt for road maintenance in the winter months will present a potential threat to surface and groundwater quality. Following recommended practices for storage and application of the salt will minimize the potential for water quality degradation while maintaining bare pavement policy. These practices may tend to increase the costs of providing facilities for salt storage; however, costs may be partially offset by the resulting conservation of salt.

Runoff from Construction Activities

A. Technical Considerations

1. Existing and Future Conditions

Because of the need to remove the cover vegetation and leave areas exposed during many construction projects, the potential for erosion and sedimentation is great. The soil loss can be extensive and can result in significant degradation of surface water through sedimentation and siltation. Since population projections indicate continued growth and development, construction activities will remain a potential source of water pollution.

2. Alternatives and Recommendations

Since erosion and sedimentation in the study area is principally site specific, each situation or occurrence must be considered in relationship to its own setting. The two major factors to be considered in erosion and sediment control are:

a. Reduction of the raindrop impact energy which reduces its dispersing and eroding power below the critical force and

b. Reduction of the velocity of the surface runoff which, in turn, lessens its abrading power and transporting capacity.

Probably the most effective method of reducing the impact energy of raindrops are those procedures which cover the soil; e.g., natural plant cover, mulching, temporary cover crops and paving or covering with non-erodable materials. If the precipitation falling on the site is not allowed to pick up velocity as it runs off then its erosive power is curtailed. Shortening the length of slope is one of the most effective methods of controlling runoff velocities. This shortening can be accomplished by various techniques such as structural measures, cropping or management patterns, or tillage practices.

It is recommended that the most cost-effective manner of instituting methods for controlling runoff from construction activities is through local land use regulatory controls.

B. Management Considerations

1. Existing Conditions

Construction controls are implemented at all levels. The Federal government imposes controls through the Federal Highway Administration, and the Corps' activities. The State imposes controls through the Site Location Law, the Great Ponds Law, the Wetlands Act, Stream Bulldozing, and Mandatory Shoreland Zoning. The Saco River Corridor Commission imposes controls on construction activities. Local controls are imposed through subdivision and zoning regulation.

2. Alternatives and Recommendations

Since the requisite legal authority to regulate construction activities exists, no institutional change is recommended. Municipalities should review, revise, and adopt appropriate versions of the Model Performance Standards for control of runoff and soil loss.

A technical review team should be funded by Federal, State, and local sources to assist the municipality in the establishment of ordinances and in the review of proposed developments.

C. Impact Assessment

The essential purpose of the recommended ordinances is to minimize the increase of runoff from agricultural lands, attempting to maintain to the extent possible the natural runoff conditions. This action will tend to eliminate storm related discharges to surface waters that may adversely affect water quality.

A secondary impact of the implementation of these ordinances could be increased costs for agricultural activities.

Petroleum Storage and Transfer

A. Technical Considerations

1. Existing and Future Conditions

From the evidence thereis no question that petroleum products have the potential to contaminate water resources in the SMRPC 208 area. Furthermore, with the potential for more than 31 million gallons of #2 home heating fuel transferred in over 150,000 transactions and with over 16 million gallons of storage capacity within the 208 area, substantial opportunity for similar oil pollution will continue to exist for the foreseeable future. Assuming little change in present technological and other controls, spills and leaks will likely culminate in local long-term environmental degradation with little or no opportunity for corrective action.

Boating activity (specifically exhaust emissions) may not cause major adverse effects on lakes; however, support facilities (e.g., marinas selling oil and fuel and doing repair work), accidents, and negligence in the handling of petroleum products may degrade water quality.

2. Alternatives and Recommendations

This planning effort did not address the large amount of technical control methods for the handling and distribution of petroleum products.

B. Management

1. Existing Conditions

Petroleum storage and transfer are currently managed by Federal, State and local governments. The Federal and State governments primarily regulate water transport, large on-land storage facilities, and discharge to groundwaters and surface waters. Local governments have the authority to control the siting of oil storage facilities adjacent to water bodies.

2. Alternatives and Recommendations

A State level program designed to identify the magnitude of petroleum related pollution should be developed. Applicable controls should be recommended and incorporated into legislative and regulatory programs. Local and regional input should be sought by the State in the design and implementation of the program.

C. Impact Assessment

As long as substantial volumes of petroleum products are handled, stored, transferred and consumed in the SMRPC 208 area, contamination of water resources is likely to continue. Assuming little change in present technological and management controls, spills and leaks will likely culminate in local long-term environmental degradation with little or no opportunity for corrective action. However, a state level program designed to improve the handling of petroleum products will minimize the potential for petroleum related pollution in Maine.

SOUTHERN MAINE REGIONAL PLANNING COMMISSION
AREAWIDE WASTE TREATMENT MANAGEMENT PLAN

IMPACT ASSESSMENT MATRIX YORK

LEGEND

- VERY NEGATIVE
- NEGATIVE
- NO IMPACT
- POSITIVE
- VERY POSITIVE

FACTORS IMPACTED

		TECHNICAL & MANAGEMENT ALTERNATIVES	NATURAL FACTORS																							CULTURAL FACTORS														COST COMPARISON	
			LAND		SURFACE WATERS									GROUNDWATER						AIR				FLORA		FAUNA				LAND USE					Recreation		SOCIAL					ECONOMIC					
			SOIL	UNIQUE PHYSICAL FEATURES	DISSOLVED OXYGEN	BIOLOGICAL OXYGEN DEMAND	SUSPENDED SOLIDS	NUTRIENTS	DRINKING WATER SUPPLY	TEMPERATURE	TURBIDITY	BACTERIA & VIRUSES	Toxic Substances & Heavy Metals	CHLORIDES	NITRATES	PHOSPHATES	HEAVY METALS	BATERIA & VIRUSES	DRINKING WATER SUPPLY	PARTICULATES	NITROGEN OXIDES	SULFUR OXIDES	TOXIC SUBSTANCES	NATURAL VEGETATION	MANAGED VEGETATION	AQUATIC VEGETATION	BIRDS	LAND ANIMALS	FISH & SHELLFISH	FOOD CHAINS	Open Space, Wetlands, Forest	AGRICULTURAL	RESIDENTIAL	COMMERCIAL	INDUSTRIAL	FISHING	WATER RECREATION	POPULATION GROWTH	DEVELOPMENT PATTERN	EMPLOYMENT	HEALTH & SAFETY	INSTITUTIONS	WATER SUPPLY	RECREATION	FISHING	MANUFACTURING	CAPITAL COST	Operation/Maintenance Cost
WASTE SOURCES	SEWAGE DISPOSAL COLLECTION & TREATMENT SYSTEMS	Treatment Alternatives: NO ACTION																																													
		Regional Alternatives																																													
		Sewer Extensions: CAPE NEDDICK NUBBLE EXTENSION																																													
		Management Alternatives: USE EXISTING AUTHORITY																																													
		Management Alternatives: DEVELOP NEW AUTHORITY																																													
	SEWAGE DISPOSAL SUBSURFACE SYSTEMS	Treatment Disposal Systems: SUBSURFACE WASTE DISPOSAL																																													
		Treatment Disposal Systems: ALTERNATIVE TOILETS																																													
		Treatment Disposal Systems: SEWER EXTENSIONS																																													
		Management Alternatives: USE EXISTING AUTHORITY																																													
		Management Alternatives: STRICT CODE ENFORCEMENT																																													
		Management Alternatives: MAINTENANCE PROGRAM																																													
		Management Alternatives: REGIONAL CODE MANAGEMENT																																													
	SEPTAGE DISPOSAL	Disposal Methods: NO ACTION																																													
		Disposal Methods: TREATMENT PLANT																																													
		Disposal Methods: LAND APPLICATION																																													
		Disposal Methods: INCINERATION																																													
		Management Activities: USE EXISTING AUTHORITY																																													
		Management Activities: REGIONALIZATION																																													
	SLUDGE DISPOSAL	Disposal Methods: NO ACTION																																													
		Disposal Methods: LAND APPLICATION																																													
		Disposal Methods: INCINERATION																																													
		Disposal Methods: COMPOSTING																																													
		Management Alternatives: USE EXISTING AUTHORITY																																													
		Management Alternatives: REGIONALIZATION																																													
	SOLID WASTE DISPOSAL	Disposal Methods: NO ACTION																																													
		Disposal Methods: SOURCE SEPARATION																																													
		Disposal Methods: BAILING OR SHREDDING																																													
		Disposal Methods: INCINERATION																																													
		Disposal Methods: INCINERATION WITH HEAT RECOVERY																																													
		Disposal Methods: SANITARY LANDFILL																																													
		Management Alternatives: USE EXISTING AUTHORITY																																													
		Management Alternatives: REGIONALIZATION																																													

KITTERY

WASTE SOURCES ADDRESSED	PRIORITY*
SEWAGE DISPOSAL - COLLECTION AND TREATMENT SYSTEMS	●
SEWAGE DISPOSAL - SUBSURFACE SYSTEMS	◉
SEPTAGE DISPOSAL	⊕
SOLID WASTE DISPOSAL	◉
RUNOFF FROM DEVELOPMENT	⊕
RUNOFF FROM AGRICULTURE	⊕
SALT STORAGE AND APPLICATION	⊕
RUNOFF FROM CONSTRUCTION ACTIVITIES	⊕
PETROLEUM STORAGE AND TRANSFER	⊕

Sewage Disposal Collection and Treatment

A. Technical Considerations

1. Existing and Future Conditions

Kittery has two distinct wastewater collection and treatment systems, one serving the main developed area of Town and the Portsmouth Naval Shipyard; the other serving Admiralty Village. In 1970 approximately 4.4 miles of sewers were constructed in Kittery to eliminate numerous discharges of the Piscataqua River. The sewer service area totals about 410 acres and serves a population of approximatley 1,100 plus the shipyard. There are 3.8 miles of sewers (about 30 years old) serving 2,000 residents of Admiralty Village. Both the Kittery and Admiralty Village collection system have combined sewers, i.e., surface runoff enters the sanitary collection systems.

In order to rectify problems in the existing sewerage systems consultants to the Town of Kittery have proposed that the substandard sewers in the Town, which were connected to the interceptor installed in 1970, should be replaced. The replacement of these sewers would virtually eliminate all of the old sewer networks and thereby remove the present sources of infiltration and inflow.

The proposed new components of the sewerage system would also effectively separate sanitary and stormwater flows and eliminate the existing combined sewer overflows at six locations.

In Admiralty Village's system the mortar joints and brick manholes of the present sanitary sewer system, if repaired, could remedy most of the problems of infiltration on this system. A detailed sewer system evaluation should be conducted.

* ● HIGH PRIORITY ◉ PRIORITY ⊕ LOW PRIORITY

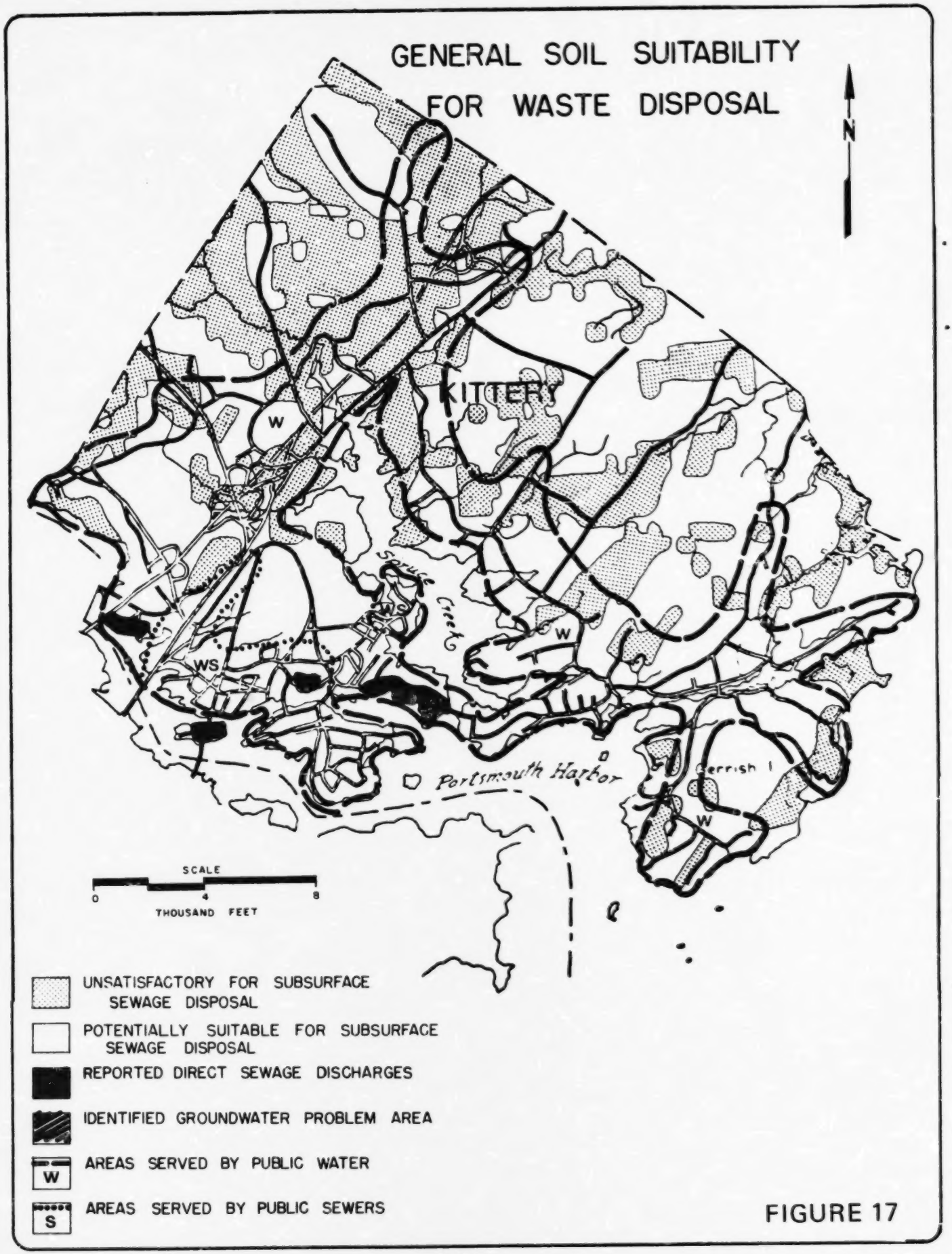

GENERAL SOIL SUITABILITY
FOR WASTE DISPOSAL
N
KITTERY
W
WS
Spruce Creek
Portsmouth Harbor
Gerrish I
SCALE
0
4
8
THOUSAND FEET
UNSATISFACTORY FOR SUBSURFACE SEWAGE DISPOSAL
POTENTIALLY SUITABLE FOR SUBSURFACE SEWAGE DISPOSAL
REPORTED DIRECT SEWAGE DISCHARGES
IDENTIFIED GROUNDWATER PROBLEM AREA
AREAS SERVED BY PUBLIC WATER
AREAS SERVED BY PUBLIC SEWERS

FIGURE 17

The plant in Kittery proper, licensed by NPDES permit No. ME0100285, Maine waste discharge license No. 389, has been in operation since 1970. Unit processes and operations include grit removal, extended aeration, aerobic digestion, final clarification, and chlorination. The aerobic digester is presently used as a septage holding tank while one of the aeration tanks functions as a digester. The effluent is discharged to the Piscataqua River, a class SB-1 waterway.

The plant is designed to treat an average flow of 1.5 mgd but actual wastewater flows average about 0.43 mgd. Wet weather conditions, however, cause substantial overloading of the plant with a concurrent decrease in treatment efficiency. There are no major industrial users. The influent contains, on the average, 160 mg/l of BOD and 226 mg/l of total suspended solids while the effluent has an average BOD content of 15 mg/l and a total suspended solids content of 19 mg/l. The removal efficiency is about 92% for both constituents. Fecal coliform counts in the effluent average less than 10 colonies per 100 ml. The facility complies with its permit discharge limitations of 30 mg/l of BOD with an 85% removal rate, 30 mg/l of total suspended solids with an average removal efficiency of 85% and 15 fecal coliform colonies per 100 ml.

According to the Environmental Protection Agency and the Maine Department of Environmental Protection, the plant is well operated and maintained. Personnel training, laboratory facilities, and maintenance programs were judged adequate. The plant is not, however, equipped with standby power.

The Admiralty Village treatment plant, an Imhoff tank, was built in the 1940's and provides only primary treatment, chlorination, and sludge digestion. The plant is licensed by NPDES permit No. ME0100862/Maine waste discharge license No. 835; effluent is discharged to Spruce Creek, a class SB-1 waterway tributary to the Piscataqua River. Sludge, until recently, was removed from the Imhoff tank to a lagoon for dewatering, but it is now dried on sand beds and then composted at the main treatment plant. About 50 cubic yards of dewatered sludge is produced annually.

Annual average rates of flow to the treatment facility are about 0.16 mgd, peak daily flows have been as high as 0.63 mgd. The BOD and total suspended solids content of the influent averages 208 and 139 mg/l, respectively. Average removal efficiencies have been low--12% for BOD and 44% for total suspended solids, resulting in an average effluent BOD and total suspended solids content of 182 and 78 mg/l, respectively. Fecal counts average less than 10 colonies per 100 ml of effluent. The facility has not, in the past, performed to the standards required by its permit--a 35% BOD and 50% total suspended solids removal efficiency.

2. Alternatives and Recommendations

The town has been considering replacing the old sewer network which would eliminate or greatly reduce infiltration/inflow as well as combined sewer overflows at pumping stations. It is suggested that

before such a program is initiated, a detailed study of the collection system (sewer system evaluation survey) should be undertaken to determine a cost-effective program to reduce infiltration/inflow and combined sewer overflows at the pumping stations. Since a portion of the infiltration, generally up to about 1,000 gallons/inch-mile/day, and inflow can be treated at a cost less than the alternatives (replacement, rehabilitation separation of sewers), the study would provide the Town with a least costly program for handling this problem.

Another near-term need is to extend sewers north along Route 1 to Cutts Road. This area is reported to have numerous malfunctioning on-site disposal systems. Soil is generally not suitable for on-site systems and for the type of commercial development that exists here. There is no other satisfactory alternative to solve the problems in this area except to provide sewers.

Also included in the near-term extension is the area from the Frisbee School to Remick Corners. This area is along one of the routes that flows from the Admiralty Village treatment facility can be conveyed, via pump station, force main and gravity sewer, to the Kittery secondary treatment facility. Estimated cost of these near-term extensions is about $1.25 million dollars.

Summary of Recommendations

The findings of this report indicate the Town of Kittery should consider undertaking, in the near-term future, the following action:

1. Abandon the Admiralty Village treatment facility and convey flows from the existing pump station to the main Kittery treatment facility.

2. Conduct a detailed sewer system evaluation survey to determine a cost-effective program to gradually eliminate combined sewer overflows and reduce infiltration/inflow.

3. Extend sewers north along Route 1.

4. Accept wastewater flows from Eliot at the main Kittery treatment facility.

5. Map and inventory the stormwater collection system.

As funds are available, the town should consider extending the sewer network to the built-up residential area south and west of Admiralty Village.

B. Management Considerations

1. Existing Conditions

The Town currently owns and operates the wastewater collection and treatment system in Kittery.

2. Alternatives and Recommendations

The following management methods were considered and discussed in the

management section of the 208 plan.

a. The single regional sewer district
b. County management of all facilities
c. Management by watershed
d. Management by sewer district for each population center
e. No change in the institutional arrangements

Although a single regional sewer district, county management or other areawide/regional management agency would tend to reduce overall administrative costs and improve consistency in the provision of collection and treatment services, the establishment of such new agencies requires extensive, new legislative and institutional frameworks. Consequently implementation of a new authority may require a long period of time. Also, individual towns would have a reduced ability for self-determination regarding a town's desires for municipal services and population growth.

The analysis of these potential management agencies resulted in the conclusion that the existing cities, towns, and sewer districts have the authority to design, construct, and manage wastewater collection changes, the existing agencies and officials that have participated in the development of the Plan will likewise participate in the immediate implementation of the Plan. Therefore, existing management agencies should continue to design, construct, and manage wastewater collection and treatment systems.

C. Impact Assessment

The abandonment of the Admiralty Village treatment plant will result in greatly improved water quality in Spruce Creek. Numerous complaints have occurred related to the performance and operation of the plant (e.g., odors). In addition, the removal of the pollution source should result in additional shellfishing opportunities. The sewer extensions along Route 1 will eliminate a documented malfunctioning subsurface problem. In addition to solving an existing problem, this sewer extension will provide a positive influence on industrial, commercial and residential growth along the Route 1 corridor.

Accepting the wastewater flows from Eliot at the main Kittery treatment facility will not adversely affect the operation of the plant nor will it significantly reduce plant capacity.

Sewage Disposal - Subsurface Systems

A. Technical Considerations

1. Existing and Future Conditions

A few coastal sections as well as all inland areas of Kittery are not served by municipal sewerage systems. Raw sewage discharges still reportedly exist, notably along Whipple Road and side streets east of the presently sewered area. Subsurface sewage disposal problems have also been reported along U.S. Route 1 from the I-95 interchange northeast of the Cutts Road intersection, a distance of about one and a half miles. Current zoning in this stretch is suburban residential and highway businesses.

2. Alternatives and Recommendations

Subsurface sewage disposal must remain as the major treatment and disposal method for domestic sewage wastes for rural or unsewered areas in the 208 region (cost of public sewers in these areas is prohibitive). Where problems have been defined, sewer service has been evaluated as an alternative to subsurface sewage disposal systems (see Sewage Disposal - Collection and Treatment Systems). Additionally, alternative toilet systems may be used to reduce the potential impact of sewage wastes on soils and groundwater.

In order to minimize future extensions of the wastewater collection system in the future, the Town should consider adopting Appendix 1 of the State Plumbing Code (which provides guidelines for minimum lot sizes where on-site systems are used--this is not a regulation) as part of the zoning ordinance.

B. Management Considerations

1. Existing Conditions

Each town presently regulates subsurface waste disposal in accordance with the State Plumbing Code. Each town has its own Local Plumbing Inspector (usually part-time) who is responsible for issuing permits and enforcing the Code. Soils analysis is done by State certified soil investigators. They submit soils reports to the Plumbing Inspector and the State Department of Human Services. Maintenance is the individual's responsibility; however, there is no legal requirement for maintenance or inspection of systems after installation.

Malfunctioning sewage disposal systems are declared by law to be a nuisance and must be abated upon order by the municipality.

2. Alternatives and Recommendations

The Maine State Plumbing Code is protective of the environment through proper design and installation of subsurface sewage disposal systems. Alternatives considered to improve the effectiveness of the Code include improved State and local enforcement, mandatory maintenance and inspection, and regionalization of inspection and enforcement programs.

There should be stricter enforcement of the Plumbing Code. This can best be achieved by employment of a full-time, well qualified inspector hired to serve one or more towns. Maintenance should be required by the State and enforced through a local or regional inspection program. A funding program for rehabilitating systems should be investigated, utilizing EPA, Farmers Home Administration, Community Services Administration, and local banks as sources.

C. Impact Assessment

The major issue associated with this waste source is the increased local cost to implement an improved enforcement and inspection program related to the Plumbing Code. This moderate increase in cost will be balanced by

improved reliability of subsurface sewage disposal resulting in improved water quality, health, and safety. A regional code enforcement program shared with Eliot would cost an estimated $6,400 per year. This cost for maintenance and enforcement of the Plumbing Code could save potential investments in expensive sewage facilities by assuring the reliability and effectiveness of subsurface disposal.

A secondary impact of this action will affect the homeowners with malfunctioning septic systems. Mandatory rehabilitation is expected to cost the homeowner of a malfunctioning system from $20 for pumping to $2,000 for replacement.

Septage Disposal

A. Technical Considerations

1. Existing and Future Conditions

Septage from Kittery and Eliot is accepted by the main Kittery Sewage Treatment Plant. A mechanical aerator is utilized to achieve a dissolved oxygen level of the septage of near saturation. The septage is then bled into the treatment facility at the rate of 75 gallons per minute in twenty minute intervals. The plant has not experienced major operational difficulties resulting from this method of septage treatment.

It has been estimated that the current annual septage production in Kittery is 633,000 gallons. The total volume of septage received at the Kittery Treatment Plant in 1975 was 324,000 gallons, or approximately 35 percent of the estimated current production. A charge of two cents per gallon of septage is required of pumpers to deposit septage at the Kittery Treatment Plant. The discrepancy in estimated and recorded septage volumes may be due in part to conservative estimates and in part to pumpers depositing septage elsewhere. The latter event may be encouraged by the required charge for disposal at the plant.

2. Alternatives and Recommendations

The alternatives for septage disposal in the area are: 1) repeated manual land spreading on the same site; 2) recycling through a green manure crop; 3) disposal in trenches; 4) disposal in sanitary landfills; or 5) treatment at a wastewater treatment facility.

The septage treatment facility in Kittery is adequate for the sound environmental disposal of this waste. Therefore, no technical recommendations are necessary for septage disposal in Kittery.

B. Management Considerations

1. Existing Conditions

The municipality is responsible for providing an approved septage disposal site and operating the site in accordance with state regulations for land disposal of septage. The State regulates the location, application, loading rates, and maintenance of the site to protect the

health of the community, and to prevent drinking water contamination. Alternatively, disposal may be accomplished at a sewage treatment plant. The City has the responsibility to manage the disposal of septage to prevent upsets at the treatment plant and to protect the health and safety of its citizens from the possible hazards of such disposal.

2. Alternatives and Recommendations

The existing management agencies have the requisite authority to properly carry out the task of septage disposal. No management changes are recommended. However, thorough, uniform enforcement of State regulations should be pursued.

C. Impact Assessment

Use of treatment plant facilities as the means for septage disposal is an effective means of processing septage before ultimate disposal on land. Processing of septage in this manner reduces the hazards associated with direct land application of septage.

Solid Waste Disposal

A. Technical Considerations

1. Existing and Future Conditions

The Kittery disposal site is located northeast of the Stevenson Road. The site is an abandoned borrow pit and rock quarry. Kittery generates approximately 8700 tons per year of solid waste, and the Portsmouth Naval Shipyard contributes an additional 4500 - 15,600 tons per year, most of which is combustible. Non-combustible refuse from the Shipyard is disposed of at a demolition debris dump on Shipyard property. The Kittery facility is presently an open burning dump, but the town is under pressure from the EPA to cease all burning. Without burning, and operated under DEP criteria for sanitary landfills, sufficient capacity remains for at most one to two years of operation.

The site is located on a secluded parcel of land. The distance to residences and wells is greater than 1000 feet, and the nearest classified body of water is about 2000 feet away. Soil conditions, however, are unsuitable for landfill use, consisting of glacial tills, outwashes, and marine sediments. The marine sediments found on the western border of the site have an impervious layer at approximately one foot of depth and a seasonal high water table at or near the surface. The glacial tills are found on the northern side of the site, often with bedrock within two feet of the surface. A large pond in this area has been filled with refuse and is highly polluted. A marshy area connects this pond with Spruce Creek, 2000 feet away. Soils to the south and east of the site are well drained outwashes of sand. The borrow pit probably consisted of this material.

The groundwater around this site is contaminated. It is difficult to determine how far this contamination travels off the site, however. The town does plan to change to another site and/or system of solid waste management within the next few years.

2. Alternatives and Recommendations

The Kittery region, including the towns of York, Berwick, South Berwick, North Berwick, and the Portsmouth Naval Shipyard, was analyzed as a disposal region in a 1974 report to the SMRPC prepared by SEA Consultants, Inc. of Boston, Massachusetts. This report recommended that the regions adopt a landfill system to be located on the Berwick - South Berwick town line. This report led to the formation of the York County Disposal District which attempted to implement a regional system. Although two bids for the operation of a regional landfill were received by the District, the towns of Kittery and York favored individual systems, and the District has since disbanded. York has initiated design of a sanitary landfill on Route 91 to replace its dump, and South Berwick has inquired about joining with York in this facility. Kittery is going ahead with a source separation/resource recovery/incineration system, and Berwick is in the process of looking for a landfill site in that town.

The existing site should be closed and covered with impervious cover material to minimize leachate problems.

B. Management Considerations

1. Existing Conditions

The municipality of Kittery owns and operates a solid waste disposal site.

2. Alternatives and Recommendations

Kittery has the option of continuing to own and operate their disposal facility or joining a regional facility. The Town has chosen to pursue the option of continuing to run their own facility.

C. Impact Assessment

The closing of the existing Kittery dump will result in reduced air quality impact from open burning, and reduced water quality impact from leachate generation.

Runoff from Development

A. Technical Considerations

1. Existing and Future Conditions

The Town of Kittery presently has two sewered areas--one in the Town and the other in Admiralty Village.

In the business district of Town there is a separate storm sewer discharging directly to Piscataqua River. The district also has a combined sewer system with five pumping stations. At each pumping station there is an outfall discharging to Piscataqua River.

The sewers in Admiralty Village were designed as combined type but built as a separate sanitary type. However, flows at the treatment indicate storm flows enter the sanitary system. Outfall from a pumping station discharges to Spruce Creek.

Rainfall in the area when transformed into runoff may be intercepted by storm sewers and combined sewers or it may run off the land following natural drainage courses.

The Town's developed areas are Kittery Point and Kittery including Admiralty Village. For each area the rational method has been applied to estimate the volume of runoff from a typical storm event of the intensity and duration that characterizes an average once-a-week storm.

STORMWATER RUNOFF

Developed Area	Drainage Area	Volume Per Storm	Receiving Waters
Kittery	195 acres	0.84 MG	Spruce Creek
	440 acres	1.91 MG	Piscataqua River
Kittery	45 acres	0.19 MG	Spruce Creek
	140 acres	0.60 MG	Piscataqua River

The concentrations of pollutants which are currently contributed to the receiving waters--on a weekly basis--as a result of stormwater runoff are shown in the table below. The loadings are derived from the "generalized parameters" of stormwater discussed in the Point Source Control section of the Plan.

LOADINGS PER WEEKLY STORM EVENT

Receiving Waters	BOD (lbs)	SS (lbs)	Total N (lbs)	Total P (lbs)	Fecal Coliform (MPN)
Spruce Creek	250	5,400	26	9	1.55×10^{12}
Piscataqua River	610	13,000	61	20	3.72×10^{12}

2. Alternatives and Recommendations

Because of the vast assimilative capacity of the Piscataqua River in the vicinity of Kittery and the ability of the tide to flush out many of the estuaries which receive storm flows, there is little need for a stormwater control plan. However, this does not mean that stormwater management should be neglected entirely. Some of the principles described in the Kittery Point Source Control Plan should be considered as part of subdivision control regulations or zoning ordinances. For example, the natural retention capacity of a wetland can be preserved by restricting development in such areas. The land between Routes 103, 235 and 1 (near Highland Cemetary) as an example of such a wetland. Consideration should also be given to on-site runoff retention in subdivision or building permit regulations. These steps can be done at no cost and can have the advantage of reducing flash floods and improving the water quality of streams.

It is also suggested that the Town have a detailed map made of the storm system showing the location of pipes, inlets, sizes and critical elevations. A sewer system evaluation survey should also be performed in order to determine the least costly solution for the separation of combined sewers. Minimizing inflow will reduce or eliminate the overflows which now occur infrequently (up to 5 times/year) at the pump station.

B. Management Considerations

1. Existing Conditions

The primary responsibility for controlling storm water runoff rest with the municipality.

2. Alternatives and Recommendations

Runoff from development can be limited by local codes and ordinances such as subdivision regulations and zoning ordinance performance standards. Additionally, the State Site Location Law requires erosion and sediment control plans for new devleopment. The existing management agencies have adequate authority to control runoff. The Town has the authority to regulate the use of land to limit runoff and the local treatment authority has the power to control collected runoff. Therefore, no institutional changes are recommended. However, to improve controls to limit runoff municipalities are urged to review, modify and adopt the model subdivision regulations and zoning ordinance performance standards included in the Plan.

A technical review team should be funded through federal, state, and local sources, to assist the municipality in establishing ordinances and in the review of proposed developments.

C. Impact Assessment

The essential purpose of the recommended ordinances is to minimize the increase of runoff from developed lands, attempting to maintain to the extent possible the natural runoff conditions. This action will tend to eliminate storm related discharges to surface waters and reduce the potential for flooding. Controlling stormwater runoff at the source will decrease the demand for expensive collection and transport facilities.

A secondary impact of the implementation of the ordinances will be increased land development costs.

Runoff from Agriculture

A. Technical Considerations

1. Existing and Future Conditions

The land use/land cover map indicates there are about 30,000 acres in agricultural use in the 208 area (12.9% of the land area). Only 10,000 acres are under intensive farming as cropland, the rest being open pasture or hay fields. The Soil Conservation Service has estimated that 66% of the farms are operated under the guidance of Conservation Plans designed to limit soil loss from the land. Because of this, the erosion and sedimentation problems associated with agricultural land

use and the potential water quality impact of runoff from these lands is considered minor for this region.

2. Alternatives and Recommendations

Structural controls to minimize agricultural runoff must be applied on a site specific basis. The Soil Conservation Service's recommended agricultural practices and controls for soil loss developed through Conservation Plans are sufficient to protect water quality in this region. Nonstructural control recommendations are in the Land Use Chapter of the Plan as locally enforced Performance Standards (see Management Considerations below).

B. Management Considerations

1. Existing Conditions

Municipalities have the authority to manage land use controls. The Saco River Corridor Commission manages the land within 1000 feet of the Saco River. Voluntary USDA programs are administered by S.C.S. and A.S.C.S. The federal programs offer technical and financial assistance to farmers to control soil loss.

2. Alternatives and Recommendations

Funding of USDA programs should be continued. Additional money should be channeled into the A.S.C.S. Program and the $2,500 cut-off per project should be raised.

Municipalities should review, revise and adopt appropriate versions of the Model Performance Standards for control of run-off and soil loss. A technical review team should be funded by federal, state, and local sources to assist the municipality in the establishing of ordinances and in the review of proposed developments.

C. Impact Assessment

The essential purpose of the recommended ordinances is to minimize the increase of runoff from agricultural lands attempting to maintain to the extent possible the natural runoff conditions. This action will tend to eliminate storm related discharges to surface waters and reduce the potential for flooding.

A secondary impact of the implementation of these ordinances will be increased costs of agricultural land use.

Salt Storage and Application

A. Technical Considerations

1. Existing and Future Conditions

Salt (sodium chloride) is used in Southern Maine to achieve bare pavement conditions during the winter months. Salt will continue to be used as long as the bare pavement policy is mandated and other highway de-icing chemicals are not used because of their prohibitive cost.

Surface water quality problems have not been associated with highway de-icing salt uses. However, a small number of individual water supplies have been found to exceed chloride standards.

2. Alternatives and Recommendations

Since use of highway de-icing salt compounds will continue, general guidelines have been presented for the storage, handling and application of these compounds. These guidelines are sensitive to the conflicting policies of bare pavements in winter and clean water and attempt to strike a balance between the two.

B. Management Considerations

1. Existing Conditions

The State and municipalities have the authority and responsibility to maintain roads and highways in the region. The State has established guidelines and procedures for highway de-icing salt storage and application, and has developed educational and training programs for local operators.

2. Alternatives and Recommendations

Existing Maine laws should be investigated for enforcement powers related to regulate the use of highway de-icing compounds. In the absence of enforceable regulations and state level standards adequate to protection of the environment and compatible with policies related to winter driving conditions, MDEP, MDOT and the other agencies should collaborate on their development. This program development should include a series of checks and balances through required reporting, surveillance and/or sampling, and analysis.

C. Impact Assessment

Continued use of highway de-icing salt for road maintenance in the winter months will present a potential threat to surface and groundwater quality. Following recommended practices for storage and application of the salt will minimize the potential for water quality degradation while maintaining bare pavement policy. These practices may tend to increase the costs of providing facilities for salt storage; however, costs may be partially offset by the resulting conservation of salt.

Runoff from Construction Activities

A. Technical Considerations

1. Existing and Future Conditions

Because of the need to remove the cover vegetation and leave areas exposed during many construction projects, the potential for erosion and sedimentation is great. The soil loss can be extensive and can result in significant degradation of surface water through sedimentation and siltation. Since population projections indicate continued growth and development, construction activities will remain a potential source of water pollution.

2. Alternatives and Recommendations

Since erosion and sedimentation in the study area is principally site specific, each situation or occurrence must be considered in relationship to its own setting. The two major factors to be considered in erosion and sediment control are:

a. Reduction of the raindrop impact energy which reduces its dispersing and eroding power below the critical force and

b. Reduction of the velocity of the surface runoff which, in turn, lessens its abrading power and transporting capacity.

Probably the most effective method of reducing the impact energy of raindrops are those procedures which cover the soil; e.g., natural plant cover, mulching, temporary cover crops and paving or covering with non-erodable materials. If the precipitation falling on the site is not allowed to pick up velocity as it runs off then its erosive power is curtailed. Shortening the length of slope is one of the most effective methods of controlling runoff velocities. This shortening can be accomplished by various techniques such as structural measures, cropping or management patterns, or tillage practices.

It is recommended that the most cost-effective manner of instituting methods for controlling runoff from construction activities is through local land use regulatory controls.

B. Management Considerations

1. Existing Conditions

Construction controls are implemented at all levels. The Federal government imposes controls through the Federal Highway Administration, and the Corps' activities. The State imposes controls through the Site Location Law, the Great Ponds Law, the Wetlands Act, Stream Bulldozing, and Mandatory Shoreland Zoning. The Saco River Corridor Commission imposes controls on construction activities. Local controls are imposed through subdivision and zoning regulation.

2. Alternatives and Recommendations

Since the requisite legal authority to regulate construction activities exists, no institutional change is recommended. Municipalities should review, revise, and adopt appropriate versions of the Model Performance Standards for control of runoff and soil loss.

A technical review team should be funded by Federal, State, and local sources to assist the municipality in the establishment of ordinances and in the review of proposed developments.

C. Impact Assessment

The essential purpose of the recommended ordinances is to minimize the increase of runoff from agricultural lands, attempting to maintain to the extent possible the natural runoff conditions. This action will tend to eliminate storm related discharges to surface waters that may adversely affect water quality.

A secondary impact of the implementation of these ordinances could be increased costs for agricultural activities.

Petroleum Storage and Transfer

A. Technical Considerations

1. Existing and Future Conditions

From the evidence there is no question that petroleum products have the potential to contaminate water resources in the SMRPC 208 area. Furthermore, with the potential for more than 31 million gallons of #2 home heating fuel transferred in over 150,000 transactions and with over 16 million gallons of storage capacity within the 208 area, substantial opportunity for similar oil pollution will continue to exist for the foreseeable future. Assuming little change in present technological and other controls, spills and leaks will likely culminate in local long-term environmental degradation with little or no opportunity for corrective action.

Boating activity (specifically exhaust emissions) may not cause major adverse effects on lakes; however, support facilities (e.g., marinas selling oil and fuel and doing repair work), accidents, and negligence in the handling of petroleum products may degrade water quality.

2. Alternatives and Recommendations

This planning effort did not address the large amount of technical control methods for the handling and distribution of petroleum products.

B. Management Considerations

1. Existing Conditions

Petroleum storage and transfer are currently managed by Federal, State and local governments. The Federal and State governments primarily regulate water transport, large on-land storage facilities, and discharge to groundwaters and surface waters. Local governments have the authority to control the siting of oil storage facilities adjacent to water bodies.

2. Alternatives and Recommendations

A State level program designed to identify the magnitude of petroleum related pollution should be developed. Applicable controls should be recommended and incorporated into legislative and regulatory programs. Local and regional input should be sought by the State in the design and implementation of the program.

C. Impact Assessment

As long as substantial volumes of petroleum products are handled, stored, transferred and consumed in the SMRPC 208 area, contamination of water resources is likely to continue. Assuming little change in present

technological and management controls, spills and leaks will likely culminate in local long-term environmental degradation with little or no opportunity for corrective action. However, a state level program designed to improve the handling of petroleum products will minimize the potential for petroleum related pollution in Maine.

SOUTHERN MAINE REGIONAL PLANNING COMMISSION
AREAWIDE WASTE TREATMENT MANAGEMENT PLAN

IMPACT ASSESSMENT MATRIX KITTERY

LEGEND

- ■ VERY NEGATIVE
- □ NEGATIVE
- □ NO IMPACT
- ■ POSITIVE
- ■ VERY POSITIVE

FACTORS IMPACTED

		TECHNICAL & MANAGEMENT ALTERNATIVES	NATURAL FACTORS: LAND		SURFACE WATERS									GROUNDWATER						AIR				FLORA			FAUNA				CULTURAL FACTORS: LAND USE					Recreation		SOCIAL						ECONOMIC				COST COMPARISON	
			SOIL	UNIQUE PHYSICAL FEATURES	DISSOLVED OXYGEN	BIOLOGICAL OXYGEN DEMAND	SUSPENDED SOLIDS	NUTRIENTS	DRINKING WATER SUPPLY	TEMPERATURE	TURBIDITY	BACTERIA & VIRUSES	Toxic Substances & Heavy Metals	CHLORIDES	NITRATES	PHOSPHATES	HEAVY METALS	BATERIA & VIRUSES	DRINKING WATER SUPPLY	PARTICULATES	NITROGEN OXIDES	SULFUR OXIDES	TOXIC SUBSTANCES	NATURAL VEGETATION	MANAGED VEGETATION	AQUATIC VEGETATION	BIRDS	LAND ANIMALS	FISH & SHELLFISH	FOOD CHAINS	Open Space, Wetlands, Forest	AGRICULTURAL	RESIDENTIAL	COMMERCIAL	INDUSTRIAL	FISHING	WATER RECREATION	POPULATION GROWTH	DEVELOPMENT PATTERN	EMPLOYMENT	HEALTH & SAFETY	INSTITUTIONS	WATER SUPPLY	RECREATION	FISHING	MANUFACTURING	CAPITAL COST	Operation/Maintenance Cost
WASTE SOURCES	SEWAGE DISPOSAL COLLECTION & TREATMENT SYSTEMS	Treatment Alternatives: NO ACTION			■	■	■				■	■																													■								
		Regional Alternatives: CONNECT TO ELIOT NEW COLLECTION SYSTEM	■		■	■	■	■		■	■				■	■		■											■	■											■				■				
		Sewer Extensions: TO NORTH ON U.S. ROUTE 1	■												■	■		■															■	■	■			■		■	■						■	■	
		Sewer Extensions: TO ADMIRALITY VILLAGE PLANT			■	■	■	■		■	■																		■	■											■			■	■				
		Management Alternatives: USE EXISTING AUTHORITY																																																
		Management Alternatives: DEVELOP NEW AUTHORITY																																								■								
	SEWAGE DISPOSAL SUBSURFACE SYSTEMS	Treatment Disposal Systems: SUBSURFACE WASTE DISPOSAL																															■					■			■								
		Treatment Disposal Systems: ALTERNATIVE TOILETS													■	■		■							■									■					■			■								
		Treatment Disposal Systems: SEWER EXTENSIONS													■	■		■															■	■											■			■	■	
		Management Alternatives: USE EXISTING AUTHORITY																																																
		Management Alternatives: STRICT CODE ENFORCEMENT													■	■		■													■						■				■									
		Management Alternatives: MAINTENANCE PROGRAM													■	■		■																			■				■									
		Management Alternatives: REGIONAL CODE MANAGEMENT																																																■
	SEPTAGE DISPOSAL	Disposal Methods: NO ACTION																																																
		Disposal Methods: TREATMENT PLANT																																																
		Disposal Methods: LAND APPLICATION																																																
		Disposal Methods: INCINERATION																																																
		Management Activities: USE EXISTING AUTHORITY																																																
		Management Activities: REGIONALIZATION																																																
	SLUDGE DISPOSAL	Disposal Methods: NO ACTION																																																
		Disposal Methods: LAND APPLICATION																																																
		Disposal Methods: INCINERATION																																																
		Disposal Methods: COMPOSTING																																																
		Management Alternatives: USE EXISTING AUTHORITY																																																
		Management Alternatives: REGIONALIZATION																																																
	SOLID WASTE DISPOSAL	Disposal Methods: NO ACTION																																																
		Disposal Methods: SOURCE SEPARATION																																												■				
		Disposal Methods: BAILING OR SHREDDING																																																
		Disposal Methods: INCINERATION		■																																														
		Disposal Methods: INCINERATION WITH HEAT RECOVERY		■																																														
		Disposal Methods: SANITARY LANDFILL																																																
		Management Alternatives: USE EXISTING AUTHORITY																																																
		Management Alternatives: REGIONALIZATION																																																

ELIOT

WASTE SOURCES ADDRESSED	PRIORITY*
SEWAGE DISPOSAL - COLLECTION AND TREATMENT SYSTEMS	●
SEWAGE DISPOSAL - SUBSURFACE SYSTEMS	⊕
SEPTAGE DISPOSAL	⊕
SOLID WASTE DISPOSAL	◉
RUNOFF FROM AGRICULTURE	⊕
SALT STORAGE AND APPLICATION	⊕
RUNOFF FROM CONSTRUCTION ACTIVITIES	⊕
PETROLEUM STORAGE AND TRANSFER	⊕

Sewage Disposal - Collection and Treatment Systems

A. Technical Considerations

1. Existing and Future Conditions

The Town of Eliot, at this time, has only a small sewerage system in a portion of South Eliot, and that is privately owned. The system consists of several hundred feet of pipe of indeterminate size which discharge to two septic tanks. The tanks, in turn, discharge to Spinney Creek in the Spinney Creek Road - Leach Road area. In addition, there are at least 6 other private outfalls to Spinney Creek downstream from the septic tank outfalls. And there are at least 23 outfalls to the Piscataqua River on the west side of Route 103.

No infiltration/inflow studies have been made of the existing small, private sewerage system. These would be done during investigations for the preparation of a '201' facilities plan.

The small private sewerage system within a neighborhood of South Eliot is not adequate to serve the needs of the Town. As a consequence, the Town has contracted with consultants to prepare a preliminary design of a sewerage system to serve most of the densely populated section of South Eliot. The preliminary design indicates treatment would take place at the Kittery secondary treatment facility.

2. Alternatives and Recommendations

The Town of Eliot should continue discussion with the Town of Kittery to determine whether Kittery will be willing to treat Eliot's wastewater at the main Kittery treatment facility, a facility which now has reserve capacity. The two towns should formalize an agreement for sharing the use of the facility. Eliot's share of both the oper-

*● HIGH PRIORITY ◉ PRIORITY ⊕ LOW PRIORITY

GENERAL SOIL SUITABILITY FOR WASTE DISPOSAL

UNSATISFACTORY FOR SUBSURFACE SEWAGE DISPOSAL

POTENTIALLY SUITABLE FOR SUBSURFACE SEWAGE DISPOSAL

REPORTED DIRECT SEWAGE DISCHARGES

IDENTIFIED GROUNDWATER PROBLEM AREA

W — AREAS SERVED BY PUBLIC WATER

S — AREAS SERVED BY PUBLIC SEWERS

SCALE

0 5 10

THOUSAND FEET

FIGURE 18

ation - maintenance costs and the capital costs are estimated to be $30,000/year. Capital costs alone for a local treatment facility in Eliot would be approximately $50,000/year (6 3/8% for 20 years). Both the 5-day biochemical oxygen demand (BOD_5) and suspended solids (SS) loads are expected to be reduced by about 85% as a result of the treatment process, before the wastewater effluent is discharged to the Piscataqua River.

A model sewer use ordinance must be adopted by the Town in order to receive Federal - State grants-in-aid. In order to meet the present needs, a wastewater collection system consisting of two pumping stations, 5,800 feet of force main and 44,000 feet of 8, 10 and 12-inch gravity sewer should be installed as funds permit. The suggested service area for 1985 would initially serve about 1,250 residents. Seasonal population changes in Eliot are not significant; thus there should be little variation in wastewater flows during the year. Capital costs for this phase are estimated to be $2,193,000 or $165,800 per year when amortized over a 30-year period at 6 3/8% interest. A portion of this cost would probably be eligible for Federal - State grants.

Preliminary plans showing the proposed locations and sizes of sewer mains have already been prepared by the Town's consulting engineers. Although soil in Kennard Corner and Crams Corner areas are generally not favorable for on-site systems, the Code Enforcement Officer has indicated (in response to a questionnaire that was a part of the SMRPC's 208 non-point source pollution control plan) that malfunctioning on-site systems are not common in these areas. Should substantial new residential (or other) development occur in this area, however, it is probable that public sewers will be needed.

The Town should also be concerned about how wastewater will be handled from potential future industrial - commercial development along Rte. 236. Soil in this area appears to be poorly suited for even home residences. New industrial - commercial development, which use and discharge significant quantities of wastewater, probably will require public sewers. If the Town desires such development, it must be prepared to provide adequate public services.

Another area which would be desirable to sewer is the Marshwood High School. The effluent from the on-site system (septic tank/sand filter/chlorination) enters Sturgeon Creek, a tributary to the Piscataqua River. The cost of constructing a pump station and force main to connect the High School to the proposed sewer service area along Rte. 103 would be approximately $300,000.

Reportedly, the Maine DEP turned down a request from the School Administration District to increase wastewater flow discharged to Sturgeon Creek to accommodate a future school complex.

If dissolved oxygen levels would be impaired in Sturgeon Creek by increased discharges it may be possible to construct a pump station at the school (and force main) so that the school's wastewater system out-fall is moved to (or nearer to) the Piscataqua River where a greater assimilative capacity exists.

Summary of Recommendations

It is suggested that the Town of Eliot: 1) negotiate an agreement with the Town of Kittery for joint use of Kittery's secondary treatment facility; and 2) construct a wastewater collection system which would initially serve about 1,250 residents (from Greenwood Street east along Rte. 103 to the Kittery town boundary). This proposed collection system would eliminate 23 known direct discharges to the Piscataqua River.

Consideration should be given to providing public sewers along Rte. 236 if commercial - industrial development is to take place in this area in the future.

Providing a public sewer to the Marshwood High School is desirable; however, the cost of extending the sewers to this institution is prohibitive.

B. Management Considerations

1. Existing Conditions

The Town of Eliot currently has the authority to own and operate a wastewater collection and treatment system.

2. Alternatives and Recommendations

Although a single regional sewer district, county management, or other areawide/regional management agency would tend to reduce overall adminstrative costs and improve consistency in the provision of collection and treatment services, the establishment of such new agencies requires extensive, new legislative and institutional frameworks. Consequently implementation of a new authority may require a long period of time. Also, individual towns would have a reduced ability for self-determination regarding a town's desires for municipal services and population growth.

The analysis of these potential management agencies resulted in the conclusion that the existing cities, towns, and sewer districts have the authority to design, construct, and manage wastewater collection and treatment facilities. In addition, by minimizing institutional changes, the existing agencies and officials that have participated in the development of the Plan will likewise participate in the immediate implementation of the Plan. Therefore, existing management agencies should continue to design, construct, and manage wastewater collection and treatment systems.

If Eliot's sewer system connects to Kittery's treatment facility, Eliot will need an interlocal agreement. The agreement will determine whether Eliot establishes its own sewer authority or shares an operating authority with Kittery. Eliot will need to adopt a sewer ordinance that meets federal regulations with respect to pretreatment, discharges into the system, user fees, etc., in order to receive federal - state construction grants-in-aid.

C. Impact Assessment

As a high priority recommendation, the Eliot development of a wastewater collection system for treatment in Kittery has been assessed for its impact in a qualitative manner utilizing a summary matrix. This matrix presents the major proposal for Eliot and relates it to the natural and cultural factors that may be impacted through primary or secondary effects.

The construction of a wastewater collection system in Eliot for treatment in Kittery would eliminate 23 known direct discharges to the Piscataqua River. In addition, other discharges to the Piscataqua will be eliminated as the sewer collection system is expanded to the year 2000. Available sewer service will increase the opportunity for commercial and industrial development in the Town, particularly if it is available along Rte. 236.

Another land use implication of providing sewer service in Eliot is that house building and population growth will be facilitated.

Sewage Disposal - Subsurface Systems

A. Technical Considerations

1. Existing and Future Conditions

The Town of Eliot does not have a public wastewater treatment and collection system; therefore, all development in the town is serviced by private treatment systems, the vast majority of which are subsurface waste disposal systems. The non-point consultant identified a potential groundwater problem on Beach Road between Wilson Road and Route 236. Additional water sampling of the area is recommended to identify the extent and cause of the problem.

2. Alternatives and Recommendations

Subsurface sewage disposal must remain as the major treatment and disposal method for domestic sewage wastes for rural or unsewered areas in the 208 region (cost of public sewers in these areas is prohibitive). Where problems have been defined, sewer service has been evaluated as an alternative to subsurface sewage disposal systems (see Sewage Disposal - Collection and Treatment Systems). Additionally, alternative toilet systems may be used to reduce the potential impact of sewage wastes on soils and groundwater.

In order to minimize future extensions of the wastewater collection system in the future, the Town should consider adopting Appendix 1 of the State Plumbing Code (which provides guidelines for minimum lot sizes where on-site systems are used--this is not a regulation) as part of the zoning ordinance.

B. Management Considerations

1. Existing Conditions

Each town presently regulates subsurface waste disposal in accordance with the State Plumbing Code. Each town has its own Local Plumbing Inspector (usually part-time) who is responsible for issuing permits and enforcing the Code. Soils analysis is done by State certified soil investigators. They submit soils reports to the Plumbing Inspector and the State Department of Human Services. Maintenance is

the individual's responsibility; however, there is no legal requirement for maintenance or inspection of systems after installation.

Malfunctioning sewage disposal systems are declared by law to be a nuisance and must be abated upon order by the municipality.

2. Alternatives and Recommendations

The Maine State Plumbing Code is protective of the environment through proper design and installation of subsurface sewage disposal systems. Alternatives considered to improve the effectiveness of the Code include improved State and local enforcement, mandatory maintenance and inspection, and regionalization of inspection and enforcement programs.

There should be stricter enforcement of the Plumbing Code. This can best be achieved by employment of a full-time, well qualified inspector hired to serve one or more towns. Maintenance should be required by the State and enforced through a local or regional inspection program. A funding program for rehabilitating systems should be investigated, utilizing EPA, Farmers Home Administration, Community Services Administration, and local banks as sources.

C. Impact Assessment

The major issue associated with this waste source is the increased local cost to implement an improved enforcement and inspection program related to the Plumbing Code. This moderate increase in cost will be balanced by improved reliability of subsurface sewage disposal resulting in improved water quality, health, and safety. A regional code enforcement program shared with Kittery would cost an estimated $15,600 per year. This cost for maintenance and enforcement of the Plumbing Code could save potential investments in expensive sewage facilities by assuring the reliability and effectiveness of subsurface disposal.

A secondary impact of this action will affect the homeowners with malfunctioning septic systems. Mandatory rehabilitation is expected to cost the homeowner of a malfunctioning system from $20 for pumping to $2,000 for replacement.

Septage Disposal

A. Technical Considerations

1. Existing and Future Conditions

The Town of Eliot disposes of its septage through the Kittery Sewage Treatment Plant.

The current annual septage production in Kittery and Eliot is estimated to be 633,000 gallons and 275,000 gallons respectively. The total volume of septage received at the Kittery Treatment Plant in 1975 was 324,000 gallons, or approximately 35 percent of the estimated current production. A charge of two cents per gallon of septage is required of pumpers to deposit septage at the Kittery Treatment Plant. The discrepancy is estimated and recorded septage volumes may be due in

part to conservative estimates and in part to pumpers depositing septage elsewhere. The latter event may be encouraged by the required charge for disposal at the plant.

2. Alternatives and Recommendations

The alternatives for septage disposal in the area are: 1) repeated manual land spreading on the same site; 2) recycling through a green manure crop; 3) disposal in trenches; 4) disposal in sanitary landfills; or 5) treatment at a wastewater treatment facility.

The septage treatment facility in Kittery is adequate for the sound environmental disposal of Eliot's waste. Therefore, no technical recommendations are necessary for septage disposal in Eliot.

B. Management Considerations

1. Existing Conditions

The municipality is responsible for providing an approved septage disposal site and operating the site in accordance with state regulations for land disposal of septage. The State regulates the location, application, loading rates, and maintenance of the site to protect the health of the community, and to prevent drinking water contamination. Alternatively, disposal may be accomplished at a sewage treatment. The City has the responsibility to manage the disposal of septage to prevent upsets at the treatment plant and to protect the health and safety of its citizens from the possible hazards of such disposal.

2. Alternatives and Recommendations

The existing management agencies have the requisite authority to properly carry out the task of septage disposal. No management changes are recommended. However, thorough, uniform enforcement of State regulations should be pursued.

C. Impact Assessment

Use of treatment plant facilities as the means for septage disposal is an effective means of processing septage before ultimate disposal on land. Processing of septage in this manner reduces the hazards associated with direct land application of septage.

Solid Waste Disposal

A. Technical Considerations

1. Existing and Future Conditions

Eliot's solid waste disposal area was opened in 1958 and is located approximately 3/4 of a mile southeast of the town on Route 236. No residences are located in the vicinity and the site is relatively well screened from the road. Burning is common. Some of the residue is being covered with soil imported by the highway department.

Soils surrounding the site were formed in marine or lacustrine sediments. The silty to silty clay soils have a perched water table ranging from the surface to three feet. Groundwater is standing on the surface both to the north and south of the site. This water appears to drain to a large swampy area to the north of the site. Although the refuse is placed in close if not direct contact with the groundwater, no adverse effect on vegetation or the groundwater was observed off site.

The disposal area is surrounded by a fire break approximately 100 feet wide. Because of the high groundwater conditions, the site is unsuitable for conversion to landfill. The cleared area, however, could have sufficient capacity for up to 7 years of operation if operated as a landfill according to DEP criteria. Provisions for leachate collection and treatment may be necessary. The estimated life is based on an annual generation of 2350 tons per year (3 pounds per capita per day) compacted to 750 pounds per cubic yard.

2. Alternatives and Recommendations

A new disposal facility will be required within the planning period. The alternatives discussed in the Plan include: sanitary landfill, baling and shredding, incineration and incineration with heat recovery. Regional disposal systems have also been considered. Eliot should continue to operate their existing landfill in conformance with MDEP operating criteria. The results of the York landfill and the Kittery incineration system should be analyzed for applicability to dispose of Eliot's waste. In addition, Eliot should consider the development of a sanitary landfill if an appropriate site can be found.

B. Management Considerations

1. Existing Conditions

The municipality of Eliot owns and operates a solid waste disposal site.

2. Alternatives and Recommendations

Eliot has the option of continuing to own and operate their disposal facility or joining a regional disposal system. A regional disposal district may be established by a special district or inter-local agreement.

C. Impact Assessment

General cost estimates indicate that a regional landfill is the most cost-effective method for solid waste disposal in the 208 area. However, incineration systems are being considered by three municipalities. Prior to a firm course of action being recommended for Eliot, a feasibility study to determine the most cost-effective and politically acceptable disposal solution should be undertaken.

In general, the alternative processing and disposal methods investigated in the plan primarily impact air and water quality. Sanitary landfills, regardless of the solid waste processing method selected, can impact water quality (groundwater and surface water) through generation of leachate. Incineration as a processing method reduces water quality impact while generating potential air quality impacts. Incineration with heat recovery has the same environmental impacts as standard incineration but reduces the economic impact (high cost of incineration) through revenues from sale of steam. Baling and shredding do not reduce water quality impact from leachate, but rather may provide economic benefit through increased landfill life. Source separation provides benefits through reduction of waste that must be disposed. These impacts are summarized in the Impact Assessment Matrix.

Runoff from Agriculture

A. Technical Considerations

1. Existing and Future Conditions

The land use/land cover map indicates there are about 30,000 acres in agricultural use in the 208 area (12.9% of the land area). Only 10,000 acres are under intensive farming as cropland, the rest being open pasture or hay fields. The Soil Conservation Service has estimated that 66% of the farms are operated under the guidance of Conservation Plans designed to limit soil loss from the land. Because of this, the erosion and sedimentation problems associated with agricultural land use and the potential water quality impact of runoff from these lands is considered minor for this region.

2. Alternatives and Recommendations

Structural controls to minimize agricultural runoff must be applied on a site specific basis. The Soil Conservation Service's recommended agricultural practices and controls for soil loss developed through Conservation Plans are sufficient to protect water quality in this region. Nonstructural control recommendations are in the Land Use Chapter of the Plan as locally enforced Performance Standards (see Management Considerations below).

B. Management Considerations

1. Existing Conditions

Municipalities have the authority to manage land use controls. The Saco River Corridor Commission manages the land within 1000 feet of the Saco River. Voluntary USDA programs are administered by S.C.S. and A.S.C.S. The federal programs offer technical and financial assistance to farmers to control soil loss.

2. Alternatives and Recommendations

Funding of USDA programs should be continued. Additional money should be channeled into the A.S.C.S. Program and the $2,500 cut-off per project should be raised.

Municipalities should review, revise and adopt appropriate versions of the Model Performance Standards for control of run-off and soil loss. A technical review team should be funded by federal, state, and local sources to assist the municipality in the establishing of ordinances and in the review of proposed developments.

C. Impact Assessment

The essential purpose of the recommended ordinances is to minimize the increase of runoff from agricultural lands attempting to maintain to the extent possible the natural runoff conditions. This action will tend to eliminate storm related discharges to surface waters and reduce the potential for flooding.

A secondary impact of the implementation of these ordinances will be increased costs of agricultural land use.

Salt Storage and Application

A. Technical Considerations

1. Existing and Future Conditions

Salt (sodium chloride) is used in Southern Maine to achieve bare pavement conditions during the winter months. Salt will continue to be used as long as the bare pavement policy is mandated and other highway de-icing chemicals are not used because of their prohibitive cost. Surface water quality problems have not been associated with highway de-icing salt uses. However, a small number of individual water supplies have been found to exceed chloride standards.

2. Alternatives and Recommendations

Since use of highway de-icing salt compounds will continue, general guidelines have been presented for the storage, handling and application of these compounds. These guidelines are sensitive to the conflicting policies of bare pavements in winter and clean water and attempt to strike a balance between the two.

B. Management Considerations

1. Existing Conditions

The State and municipalities have the authority and responsibility to maintain roads and highways in the region. The State has established guidelines and procedures for highway de-icing salt storage and application, and has developed educational and training programs for local operators.

2. Alternatives and Recommendations

Existing Maine laws should be investigated for enforcement powers related to regulate the use of highway de-icing compounds. In the absence of enforceable regulations and state level standards adequate to protection of the environment and compatible with policies related to winter driving conditions, MDEP, MDOT and the other agencies should collaborate on their development. This program development should include a series of checks and balances through required reporting,

surveillance and/or sampling, and analysis.

C. Impact Assessment

Continued use of highway de-icing salt for road maintenance in the winter months will present a potential threat to surface and groundwater quality. Following recommended practices for storage and application of the salt will minimize the potential for water quality degradation while maintaining bare pavement policy. These practices may tend to increase the costs of providing facilities for salt storage; however, costs may be partially offset by the resulting conservation of salt.

Runoff from Construction Activities

A. Technical Considerations

1. Existing and Future Conditions

Because of the need to remove the cover vegetation and leave areas exposed during many construction projects, the potential for erosion and sedimentation is great. The soil loss can be extensive and can result in significant degradation of surface water through sedimentation and siltation. Since population projections indicate continued growth and development, construction activities will remain a potential source of water pollution.

2. Alternatives and Recommendations

Since erosion and sedimentation in the study area is principally site specific, each situation or occurrence must be considered in relationship to its own setting. The two major factors to be considered in erosion and sediment control are:

a. Reduction of the raindrop impact energy which reduces its dispersing and eroding power below the critical force and

b. Reduction of the velocity of the surface runoff which, in turn, lessens its abrading power and transporting capacity.

Probably the most effective method of reducing the impact energy of raindrops are those procedures which cover the soil; e.g., natural plant cover, mulching, temporary cover crops and paving or covering with non-erodable materials. If the precipitation falling on the site is not allowed to pick up velocity as it runs off then its erosive power is curtailed. Shortening the length of slope is one of the most effective methods of controlling runoff velocities. This shortening can be accomplished by various techniques such as structural measures, cropping or management patterns, or tillage practices.

It is recommended that the most cost-effective manner of instituting methods for controlling runoff from construction activities is through local land use regulatory controls.

B. Management Considerations

1. Existing Conditions

Construction controls are implemented at all levels. The Federal government imposes controls through the Federal Highway Administration, and the Corps' activities. The State imposes controls through the Site Location Law, the Great Ponds Law, the Wetlands Act, Stream Bulldozing, and Mandatory Shoreland Zoning. The Saco River Corridor Commission imposes controls on construction activities. Local controls are imposed through subdivision and zoning regulation.

2. Alternatives and Recommendations

Since the requisite legal authority to regulate construction activities exists, no institutional change is recommended. Municipalities should review, revise, and adopt appropriate versions of the Model Performance Standards for control of runoff and soil loss.

A technical review team should be funded by Federal, State, and local sources to assist the municipality in the establishment of ordinances and in the review of proposed developments.

C. Impact Assessment

The essential purpose of the recommended ordinances is to minimize the increase of runoff from agricultural lands, attempting to maintain to the extent possible the natural runoff conditions. This action will tend to eliminate storm related discharges to surface waters that may adversely affect water quality.

A secondary impact of the implementation of these ordinances could be increased costs for agricultural activities.

Petroleum Storage and Transfer

A. Technical Considerations

1. Existing and Future Conditions

From the evidence there is no question that petroleum products have the potential to contaminate water resources in the SMRPC 208 area. Furthermore, with the potential for more than 31 million gallons of #2 home heating fuel transferred in over 150,000 transactions and with over 16 million gallons of storage capacity within the 208 area, substantial opportunity for similar oil pollution will continue to exist for the foreseeable future. Assuming little change in present technological and other controls, spills and leaks will likely culminate in local long-term environmental degradation with little or no opportunity for corrective action.

Boating activity (specifically exhaust emissions) may not cause major adverse effects on lakes; however, support facilities (e.g., marinas selling oil and fuel and doing repair work), accidents, and negligence in the handling of petroleum products may degrade water quality.

2. Alternatives and Recommendations

This planning effort did not address the large amount of technical control methods for the handling and distribution of petroleum products.

B. Management

1. Existing Conditions

Petroleum storage and transfer are currently managed by Federal, State and local governments. The Federal and State governments primarily regulate water transport, large on-land storage facilities, and discharge to groundwaters and surface waters. Local governments have the authority to control the siting of oil storage facilities adjacent to water bodies.

2. Alternatives and Recommendations

A State level program designed to identify the magnitude of petroleum related pollution should be developed. Applicable controls should be recommended and incorporated into legislative and regulatory programs. Local and regional input should be sought by the State in the design and implementation of the program.

C. Impact Assessment

As long as substantial volumes of petroleum products are handled, stored, transferred and consumed in the SMRPC 208 area, contamination of water resources is likely to continue. Assuming little change in present technological and management controls, spills and leaks will likely culminate in local long-term environmental degradation with little or no opportunity for corrective action. However, a State level program designed to improve the handling of petroleum products will minimize the potential of petroleum related pollution in Maine.

SOUTHERN MAINE REGIONAL PLANNING COMMISSION
AREAWIDE WASTE TREATMENT MANAGEMENT PLAN

IMPACT ASSESSMENT MATRIX ELIOT

LEGEND

- ■ VERY NEGATIVE
- □ NEGATIVE
- □ NO IMPACT
- ■ POSITIVE
- ■ VERY POSITIVE

FACTORS IMPACTED

			NATURAL FACTORS																					CULTURAL FACTORS														COST COMPARISON	
			LAND		SURFACE WATERS									GROUNDWATER						AIR				FLORA			FAUNA				LAND USE						Recreation		SOCIAL					ECONOMIC					
	TECHNICAL & MANAGEMENT ALTERNATIVES		SOIL	UNIQUE PHYSICAL FEATURES	DISSOLVED OXYGEN	BIOLOGICAL OXYGEN DEMAND	SUSPENDED SOLIDS	NUTRIENTS	DRINKING WATER SUPPLY	TEMPERATURE	TURBIDITY	BACTERIA & VIRUSES	Toxic Substances & Heavy Metals	CHLORIDES	NITRATES	PHOSPHATES	HEAVY METALS	BATERIA & VIRUSES	DRINKING WATER SUPPLY	PARTICULATES	NITROGEN OXIDES	SULFUR OXIDES	TOXIC SUBSTANCES	NATURAL VEGETATION	MANAGED VEGETATION	AQUATIC VEGETATION	BIRDS	LAND ANIMALS	FISH & SHELLFISH	FOOD CHAINS	Open Space, Wetlands, Forest	AGRICULTURAL	RESIDENTIAL	COMMERCIAL	INDUSTRIAL	FISHING	WATER RECREATION	POPULATION GROWTH	DEVELOPMENT PATTERN	EMPLOYMENT	HEALTH & SAFETY	INSTITUTIONS	WATER SUPPLY	RECREATION	FISHING	MANUFACTURING	CAPITAL COST	Operation/Maintenance Cost
WASTE SOURCES	SEWAGE DISPOSAL COLLECTION & TREATMENT SYSTEMS	Treatment Alternatives	NO ACTION																																														
			NEW ELIOT TREATMENT SYSTEM	■		■	■	■			■	■			■	■		■														■	■	■			■		■		■					■	■	■	■
		Regional Alternatives	TREATMENT AT KITTERY STP	■		■	■	■			■	■			■	■		■														■	■	■			■		■		■					■	■		
		Sewer Extensions	COLLECTION SYSTEM FOR SOUTH ELIOT	■		■	■	■			■	■			■	■		■														■	■	■			■		■		■					■	■		
		Management Alternatives	USE EXISTING AUTHORITY																																														
			DEVELOP NEW AUTHORITY																																														
	SEWAGE DISPOSAL SUBSURFACE SYSTEMS	Treatment Disposal Systems	SUBSURFACE WASTE DISPOSAL																													■					■		■									
			ALTERNATIVE TOILETS												■		■							■									■					■		■									
			SEWER EXTENSIONS												■		■																■	■				■	■	■						■	■	■	■
		Management Alternatives	USE EXISTING AUTHORITY																																														
			STRICT CODE ENFORCEMENT												■		■														■					■				■									
			MAINTENANCE PROGRAM												■		■																			■				■									
			REGIONAL CODE MANAGEMENT																																														■
	SEPTAGE DISPOSAL	Disposal Methods	NO ACTION																																														
			TREATMENT PLANT																																														
			LAND APPLICATION																																														
			INCINERATION																																														
		Management Activities	USE EXISTING AUTHORITY																																														
			REGIONALIZATION																																														
	SLUDGE DISPOSAL	Disposal Methods	NO ACTION																																														
			LAND APPLICATION																																														
			INCINERATION																																														
			COMPOSTING																																														
		Management Alternatives	USE EXISTING AUTHORITY																																														
			REGIONALIZATION																																														
	SOLID WASTE DISPOSAL	Disposal Methods	NO ACTION	■							■			■	■	■	■														■															■			
			SOURCE SEPARATION	■							■			■	■	■	■														■									■							■		
			BAILING OR SHREDDING	□																																												■		
			INCINERATION	■							■			■	■	■	■														■															■	■		
			INCINERATION WITH HEAT RECOVERY	■							■			■	■	■	■														■															■	■		
			SANITARY LANDFILL																																														
		Management Alternatives	USE EXISTING AUTHORITY																																														
			REGIONALIZATION																																														■

SOUTH BERWICK

WASTE SOURCES ADDRESSED	PRIORITY*
SEWAGE DISPOSAL - COLLECTION AND TREATMENT SYSTEMS	●
SEWAGE DISPOSAL - SUBSURFACE SYSTEMS	●
SEPTAGE DISPOSAL	⊕
SLUDGE DISPOSAL	◉
SOLID WASTE DISPOSAL	◉
RUNOFF FROM DEVELOPMENT	⊕
RUNOFF FROM AGRICULTURE	⊕
SALT STORAGE AND APPLICATION	⊕
RUNOFF FROM CONSTRUCTION ACTIVITIES	⊕
PETROLEUM STORAGE AND TRANSFER	

Sewage Disposal - Collection and Treatment

A. Technical Considerations

1. Existing and Future Conditions

The South Berwick Sewer District's wastewater collection system, serving only the populous southwestern part of Town, carries mostly sanitary wastes; two stormwater inlets, however, are still connected to the system. There are only two industries connected to the collection system. The larger industry in town, a shoe company, has no pumping stations. Most of the sewers have been installed within the last ten years, but parts of the system date back to 1917. All sewer pipes are of vitrified clay.

There are 6.6 miles of sanitary sewer in the Town of which about 1.4 miles remains from the original system installed 60 years ago. The Town also has a small stormwater collection system, most of which is on Main Street.

South Berwick's primary treatment plant, licensed by NPDES permit No. ME0100820/Maine waste discharge license No. 888, has been operational since 1965. Unit operations include: screening, grit removal, comminution, sedimentation and chlorination. Effluent is discharged to the Salmon Falls River, a class B-1 waterway.

The plant is designed to treat an average flow of 0.3 mgd; flows average on an annual basis, 0.21 mgd. Peak flows have reached as high as 1.4 mgd. There are no major industrial users and the plant does not accept

* ● HIGH PRIORITY ◉ PRIORITY ⊕ LOW PRIORITY

GENERAL SOIL SUITABILITY FOR WASTE DISPOSAL

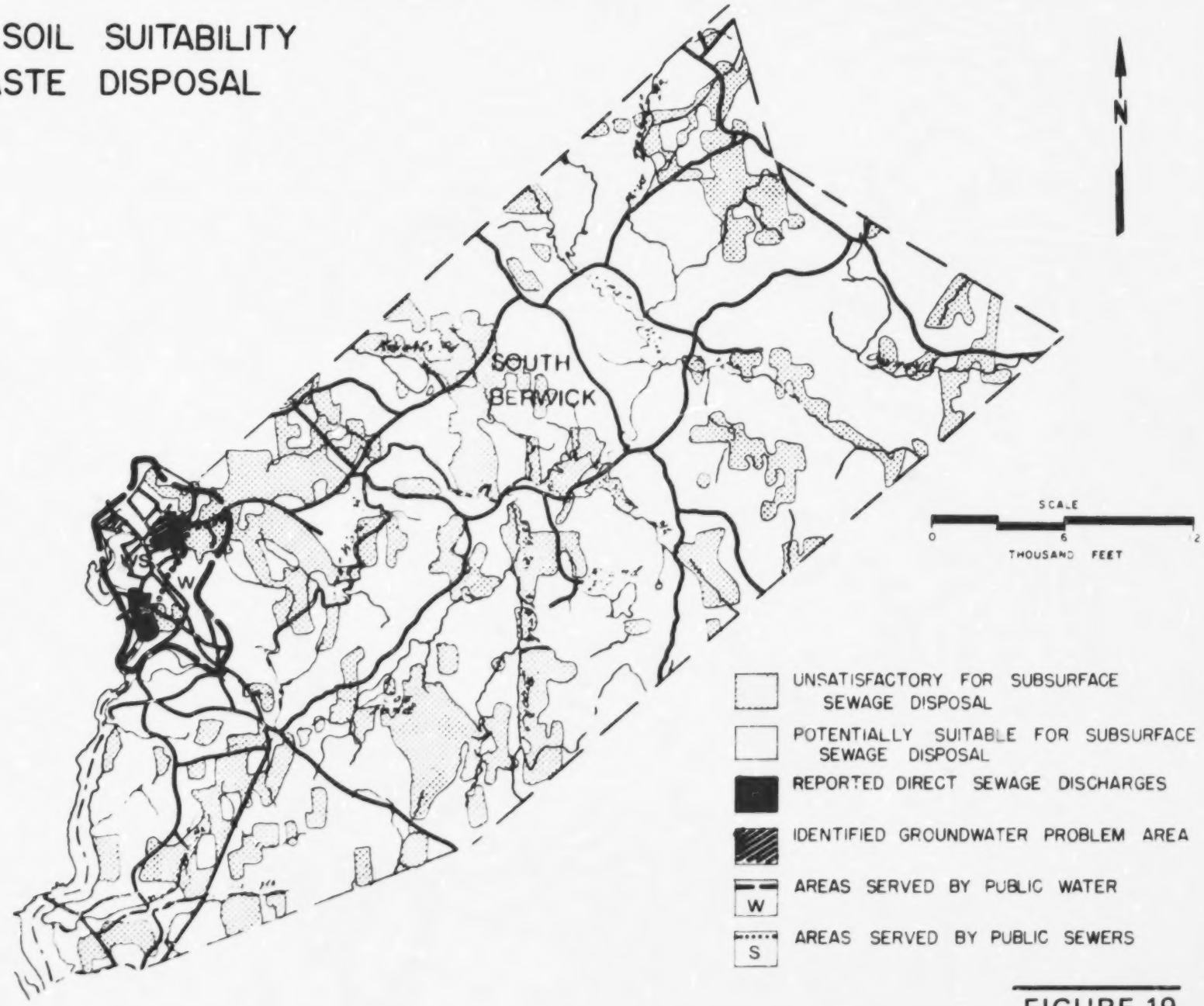


FIGURE 19

septage. The facility produces approximately 10 cubic yards of dewatered sludge annually. The sludge is stabilized in an anaerobic digester before dewatering on sand drying beds. The dewatered sludge is either used as a soil conditioner or buried at the Town solid waste disposal area.

The BOD and total suspended solids content of the influent averages 235 and 75 mg/l, respectively. The BOD and total suspended solids content of the effluent averages 143 and 32 mg/l; an average removal rate of 39% for BOD and 54% for total suspended solids. Fecal coliform counts have ranged from zero to "too numerous to count" in a 100 ml sample.

The plant has not consistently performed up to the limitations outlined in its Maine discharge permit for suspended solids removal (50%) and fecal coliform counts (60 colonies/100 ml). The required biochemical oxygen demand (BOD) removal rate of 35% has been consistently met.

According to the Maine DEP, the treatment plant is well-operated and maintained. Operators, however, do not attend formal training courses and the plant is not equipped with a laboratory to perform suspended solids or fecal coliform tests; nor is it equipped with standby power. Floating sludge in the sedimentation tanks has periodically been a problem. There have been no by-passes at the treatment facility.

The capacity of sewers in the South Berwick Sewer District, carrying mostly sanitary wastewater, appears to be quite adequate to meet present and future needs. Reduction of infiltration, however, both from some of the old sewers and some more recently installed lines, can be shown to be cost-effective.

2. Alternatives and Recommendations

One of the major reasons for near-term extension of the sewer service area in South Berwick is to provide public sewerage facilities to the Marshwood Junior High School. This institution has had problems with its on-site wastewater treatment system and immediate attention to these problems has been requested. Rehabilitation of the system, however, will not provide a long-term solution to the school's problem. Approximately 3,200 feet of 8-inch gravity sewer (at a cost of about $112,000) would be required to sewer the Junior High School.

Future sewer extensions to be built between 1985 and 2000* should continue towards the Great Works Village where the Code Enforcement Officer has indicated there are subsurface sewage disposal problems. This area can be served by gravity sewers (i.e. without a pumping station). In addition, servicing the area to the south, towards the Great Works River is desirable--also because of on-site sewage disposal problems, but higher-cost pumping facilities would be required there. Town officials should periodically check the severity of pollution and health problems in this area and provide sewerage facilities when it

*If funds are available, those should be built prior to 1985.

becomes necessary. Similar conditions exist: 1) on Agamenticus Road, just to the east of the present collection system, and 2) in the area south of the Great Works River as far as Old South Road. But in these areas on-site systems should, if possible, be rehabilitated, and future development should be restricted so as to avoid the need for public sewerage to serve these outlying areas.

The Salmon Falls - Piscataqua River, the treatment plant effluent receiving stream, generally meets, at this time, its B-1 stream classification except for both total and fecal coliform concentrations. The projected BOD loadings to the River are not large in comparison with the probable assimilative capacity of the River, especially since the influence of tidal mixing and dilution extends for a considerable distance upstream. In the area of South Berwick, the Salmon Falls - Piscataqua River has been classified as effluent limited, that is, the River is expected to meet the goal of fishable/swimmable water with secondary treatment of influent sanitary wastes; tertiary treatment of nutrient removal are not required.

Participation in a regional treatment system with either Berwick, Rollinsford or Somersworth, land application of the sewage, and complete effluent reuse are either impractical at this time or not as economical as a separate secondary biological facility in South Berwick. Stabilization ponds and intermittent sand filters, are also considered impractical because of a lack of sufficient land area near the existing primary facility. Trickling filters are not reliable in colder climates and physical-chemical treatment, while also being more costly than biological treatment, generates large amounts of sludge and requires skilled operators. The activated sludge process, either contact-stabilization or extended aeration, the rotating biological contactor oxidation ditch and aerated lagoon are, at this time, considered to be the feasible treatment alternatives. The capital cost of either alternative is about $550,000. Since funds for the treatment facility probably won't be available until October, 1980, the preferred treatment alternative will be selected and the process design should be deferred until that time. Better information on the operation of rotating biological contactors and oxidation ditches should be available and allow a better choice of the many options available.

Summary of Recommendations

South Berwick's sewage collection subsystem should be surveyed in detail (sewer system evaluation survey) in order to correct current problems with excessive infiltration. The estimated cost of such a survey is $44,000; the sewer district, with the survey's results, would then be able to pinpoint those specific areas where sewer rehabilitation would be most cost-effective. It is also recommended that sewerage facilities be extended to Marshwood Junior High School (at an estimated cost of $112,000) so that sewage from that institution, instead of causing disposal problems at the school site, can be treated at the sewer district's treatment plant.

South Berwick's primary treatment plant must be upgraded, in accordance with requirements of Federal Law (PL 92-500), to provide secondary

treatment. A "201 Facility Plan" for the Town is currently being prepared. Estimated capital cost of the secondary facility is $550,000.

B. Management Considerations

1. Existing Conditions

The South Berwick Sewer District owns and operates the wastewater collection and treatment system in the Town.

2. Alternatives and Recommendations

The following management methods were considered and discussed in the management section of the 208 plan.

a. One single regional sewer district
b. County management of all facilities
c. Management by watershed
d. Management by sewer district for each population center
e. No change in the institutional arrangements

Although a single regional sewer district, county management, or other areawide/regional management agency would tend to reduce overall administrative costs and improve consistency in the provision of collection and treatment services, the establishment of such new agencies requires extensive, new legislative and institutional frameworks. Consequently implementation of a new authority may require a long period of time. Also, individual towns would have a reduced ability for self-determination regarding a town's desires for municipal services and population growth.

The analysis of these potential management agencies resulted in the conclusion that the existing cities, towns, and sewer districts have the authority to design, construct, and manage wastewater collection and treatment facilities. In addition, by minimizing institutional changes, the existing agencies and officials that have participated in the development of the Plan will likewise participate in the immediate implementation of the Plan. Therefore, existing management agencies should continue to design, construct, and manage wastewater collection and treatment systems.

C. Impact Assessment

As a high priority recommendation, modifications to South Berwick's wastewater collection and treatment facilities have been assessed for their impact in a qualitative manner utilizing a summary matrix. This matrix presents the major proposals for South Berwick's system and relates these to the natural and cultural factors that may be impacted through primary or secondary effects of the proposed facilities.

If the South Berwick Sewer District does not provide secondary treatment, the State DEP could limit new connections to the sewerage system. This could eliminate any opportunity to attract new industrial or commercial development. While the primary treatment facility of effluent would con-

tinue to degrade the Salmon Falls River, particularly just downstream of the outfall, it does not appear that the effluent will cause the dissolved oxygen levels in the River to fall below the New Hampshire or Maine standards for a "B" classification river. New Hampshire officials sampled the Piscataqua River in 1976 and found that the "B" classification for dissolved oxygen was being met.

If the sewers are not extended, pollution from poorly functioning on-site subsurface sewage disposal systems could create a health hazard. Of particular concern is the failing system at the Marshwood Junior High School.

Without a sewer system evaluation survey to locate where excessive infiltration is occurring and determine a cost-effective program for rehabilitation of sewers, the District will continue to incur the high operating costs (associated with excessive infiltration) at the treatment facility--especially for pumping and chlorine. Excessive infiltration, however, is not in this case responsible for overflows or bypasses of wastewater to the Salmon Falls River. Rehabilitation is recommended primarily for economic reasons.

Similarly, without elimination of inflow from Butler and Parent Streets there will continue to be high operating costs associated with pumping and chlorinating the inflow. The high rate of inflow produces a slug hydraulic load to the treatment plant which decreases the treatment plant's efficiency. The resulting lower quality effluent would have a greater impact on the Salmon Falls River than if the primary facility were operated with inflow reduced.

Sewerage Disposal - Subsurface Systems

A. Technical Considerations

1. Existing and Future Conditions

Outside of the area of the Sewer District all homes and other buildings in Town are served by on-lot disposal systems; slightly less than one-half of the Town is so served. There are some malfunctioning systems among these--mostly along Route 236 and nearby roads, from the vicinity of Berwick Academy to as far away as Jewett Corner. A smaller area where there are also problems with septic tanks is along Agamenticus Road, between the Portland and Woodlawn cemeteries.

2. Alternatives and Recommendations

Subsurface sewage disposal must remain as the major treatment and disposal method for domestic sewage wastes for rural or unsewered areas in the 208 region (cost of public sewers in these areas is prohibitive). Where problems have been defined, sewer service has been evaluated as an alternative to subsurface sewage disposal systems (see Sewage Disposal - Collection and Treatment Systems). Additionally, alternative toilet systems may be used to reduce the potential impact of sewage wastes on soils and groundwater.

In order to minimize future extensions of the wastewater collection system in the future, the Town should consider adopting Appendix 1 of the State Plumbing Code (which provides guidelines for minimum lot sizes where on-site systems are used--this is not a regulation) as part of the zoning ordinance.

B. Management Considerations

1. Existing Conditions

Each town presently regulates subsurface waste disposal in accordance with the State Plumbing Code. Each town has its own Local Plumbing Inspector (usually part-time) who is responsible for issuing certified soil investigators. They submit soils reports to the Plumbing Inspector and the State Department of Human Services. Maintenance is the individual's responsibility; however, there is no legal requirement for maintenance or inspection of systems after installation.

Malfunctioning sewage disposal systems are declared by law to be a nuisance and must be abated upon order by the municipality.

2. Alternatives and Recommendations

The Maine State Plumbing Code is protective of the environment through proper design and installation of subsurface sewage disposal systems. Alternatives considered to improve the effectiveness of the Code include improved State and local enforcement, mandatory maintenance and inspection, and regionalization of inspection and enforcement programs.

There should be stricter enforcement of the Plumbing Code. This can best be achieved by employment of a full-time, well qualified inspector hired to serve one or more towns. Maintenance should be required by the State and enforced through a local or regional inspection program. A funding program for rehabilitating systems should be investigated, utilizing EPA, Farmers Home Administration, Community Services Administration, and local banks as sources.

C. Impact Assessment

The major issue associated with this waste source is the increased local cost to implement an improved enforcement and inspection program related to the Plumbing Code. This moderate increase in cost will be balanced by improved reliability of subsurface sewage disposal resulting in improved water quality, health, and safety. A regional code enforcement program shared with Wells and York would cost an estimated $3,600 per year. This cost for maintenance and enforcement of the Plumbing Code could save potential investments in expensive sewage facilities by assuring the reliability and effectiveness of subsurface disposal.

A secondary impact of this action will affect the homeowners with malfunctioning septic systems. Mandatory rehabilitation is expected to cost the homeowner of a malfunctioning system from $20 for pumping to $2,000 for replacement.

Septage Disposal

A. Technical Considerations

1. Existing and Future Conditions

Septage (septic tank pumpage) is currently estimated at 110,000 gallons annually in South Berwick, it is expected to increase to 175,000 gallons by the year 2000. At the present time septage is being disposed of on land at a privately owned site off Hooper Sands Road. The site contains six acres approved by the Maine Department of Human Services--Division of Health Engineering for application at a maximum loading rate of 18,500 gallons per acre per year. Thus this site is adequate to handle the present septage production and present practices do not appear to be causing any potential health hazards.

2. Alternatives and Recommendations

The present septage disposal site, while adequate for current loadings, is too small for the anticipated year 2000 septage production rate of 175,000 gallons per year.

To handle this anticipated increase, the site must either be expanded by 3.5 acres or additional capacity must be provided at the proposed secondary treatment facility, either for the entire quantity of septage produced annually in Town or for just the quantity in excess of that applied at the present disposal site (65,000 gallons per year). Since septage can be an expensive waste to treat at a wastewater disposal facility and since the current disposal site is adequate, the Town should consider expanding the existing disposal site, when needed, to handle increased septage loadings.

B. Management Considerations

1. Existing Conditions

The municipality is responsible for providing an approved septage disposal site and operating the site in accordance with state regulations or land disposal of septage. The State regulates the location, application, loading rates, and maintenance of the site to protect the health of the community, and to prevent drinking water contamination. Alternatively, disposal may be accomplished at a sewage treatment plant. The City has the responsibility to manage the disposal of septage or prevent upsets at the treatment plant and to protect the health and safety of its citizens from the possible hazards of such disposal.

2. Alternatives and Recommendations

The existing management agencies have the requisite authority to properly carry out the task of septage disposal. No management changes are recommended. However, thorough, uniform enforcement of State regulations should be pursued.

C. Impact Assessment

Use of treatment plant facilities as the means for septage disposal is an effective means of processing septage before ultimate disposal on land. Processing of septage is this manner reduces the hazards associated with direct land application of septage. However, the current method of land application is less expensive and with adequate control of application, water quality problems should not be significant.

Sludge Disposal

A. Technical Considerations

1. Existing and Future Conditions

The South Berwick wastewater treatment facility produces approximately 10 cubic yards of sludge per year. When sludge is wasted, it is made available to the public for use as a soil conditioner. What remains is deposited at the solid waste disposal area located on Agamenticus Road.

Soils at the disposal site are mapped as Walpole Sandy Loam, which is not recommended for sludge disposal. The disposal site is bordered on the west by open agricultural space. The closest homes to the site are located across Agamenticus Road, a few hundred feet from the site. These residences are not served by the public water system. The disposal site abuts a marsh area, and the groundwater table is close to the surface. Consequently, leachate has immediate access to the groundwater system in the area.

2. Alternatives and Recommendations

The existing site is not recommended for disposal of large quantities of sludge which may result from ongoing facilities planning recommendations.

The plan has considered a number of technical alternatives for sludge disposal including incineration, composting and land disposal.

South Berwick has several potentially suitable sites for sludge disposal. A 90 acre site consisting of partially open fields is located in the vicinity of Emery's Bridge Road, York Road, and Hoopers Brook. This area is mapped with Windsor-Deerfield soils and has a recommended loading rate of 100 pounds nitrogen per acre per year. Two open field areas are located on the border of South Berwick and Berwick. These sites total 30 acres of soil which has a recommended nitrogen loading rate of 500 pounds nitrogen per acre per year. A fourth site for sludge disposal might be the existing septage disposal area which is discussed in the preceding section. It is anticipated that a 30 acre sludge disposal site would cost approximately $40,000 including the necessary engineering. A study to determine the most cost-effective disposal method for South Berwick should be undertaken.

B. Management Considerations

1. Existing Conditions

The municipality is responsible for providing an approved sludge dis-

posal site and operating the site in accordance with state regulations for land disposal of sludge. The State regulates the location of the site, application, loading rates, and maintenance of the site to protect the health of the community, and to prevent drinking water contamination.

2. Alternatives and Recommendations

The existing management agencies have the requisite authority to properly carry out the task of sludge disposal. No management changes are recommended. However, thorough, uniform enforcement of state regulations should be pursued.

C. Impact Assessment

The general recommendation stated above is to undertake a detailed feasibility study for the disposal of the sludge to be generated by the new secondary treatment facility. Applicable disposal alternatives have been identified and assessed in general in the Plan. A more detailed impact assessment will be required once the feasibility study develops a specific recommendation. The Impact Assessment Matrix generally assesses the impact of the alternative disposal methods. This can provide guidance to the municipality in its evaluation of the alternatives.

Solid Waste Disposal

A. Technical Considerations

1. Existing and Future Conditions

The South Berwick waste disposal area is located on the north side of the Agamenticus Road, about half a mile east of the town. The site has been used for about 40 years as a burning dump, and its capacity is nearly used up. Municipal waste and scrap waste from the South Berwick Shoe Company make up approximately 2,900 tons of refuse per year which is disposed of at the site. Tires, brush, white goods, and the shoe waste are piled separately from the other trash. The shoe company is presently in the process of acquiring a shredder for their waste. Covering and compaction of residue take place two to three times a year.

The site is relatively secluded although there are a number of houses nearby. A fire break has been constructed around the site. Soils surrounding the site are derived from coarse textured outwashes, and are characterized by a high groundwater table. The soils do not meet DEP criteria for landfill use. No adverse effects on water or vegetation were noted. Groundwater apparently migrates in a northerly direction toward a branch of Lover's Brook. South Berwick will require a new disposal site by 1980.

2. Alternatives and Recommendations

A new disposal facility will be required within the planning period. The alternatives discussed in the Plan include: sanitary landfill, baling and shredding, incineration and incineration with heat recovery. Regional disposal systems have also been considered. South

Berwick should continue to operate their existing landfill in conformance with MDEP operating criteria until a new site is found. York land fill site and the Kittery incineration system should be considered for their ability to accept South Berwick's waste. In addition, South Berwick should consider the development of a sanitary landfill if an appropriate site can be found.

B. Management Considerations

1. Existing Conditions

The municipality of South Berwick owns and operates a solid waste disposal site.

2. Alternatives and Recommendations

South Berwick has the option of continuing to own and operate their disposal facility or joining a regional disposal system. A regional disposal district may be established by a special district or interlocal agreement.

C. Impact Assessment

In general, the alternative processing and disposal methods investigated in the plan primarily impact air and water quality. Sanitary landfills, regardless of the solid waste processing method selected, can impact water quality (groundwater and surface water) through generation of leachate. Incineration as a processing method reduces water quality impact while generating potential air quality impacts. Incineration with heat recovery has the same environmental impacts as standard incineration but reduces the economic impact (high cost of incineration) through revenues from sale of steam. Baling and shredding do not reduce water quality impact from leachate, but rather may provide economic benefit through increased landfill life. Source separation provides benefits through reduction of waste that must be disposed. These impacts are summarized in the Impact Assessment Matrix.

Runoff from Development

A. Technical Considerations

1. Existing and Future Conditions

South Berwick's sewers are essentially separated sanitary sewers. Stormwater runoff, therefore, does not generally find its way into the Town's sewers, but instead runs off overland to natural waterways. The only major storm sewer is on Main Street.

The Town's urban area is considered to be the area served by the Sewer District. The "rational method" has been applied in order to calculate the volume (in cfs) of runoff in the urban area from a typical storm event of the intensity and duration that occurs, on the average, once per week.*

*Rainfall with an intensity of 0.13 in/hr and duration of 3.1 hours.

STORMWATER RUNOFF

Urban Area	Drainage Acreage	Storm Runoff (Q - CIA)	Volume per storm	Receiving Waters
Village	350 acres	18 cfs	202,500 cf (1.52 MG)	Salmon Falls River/ Piscataqua River

Coliform bacteria is, and shall continue to be, the most important contaminant discharged in South Berwick's urban stormwater. Fecal coliform levels in the Salmon Falls River are, seriously above standard. If fecal coliform levels are actually of an order of magnitude as indicated by the above estimate, then stormwater discharge may be a significant contributor to the fecal coliform problem in the river, during and immediately following storm events. However, no consideration of remedial action is warranted prior to the completion of a field investigation at the actual sources of the fecal coliform found in the river.

2. Alternatives and Recommendations

The adoption of the stormwater control principals described in the South Berwick Point Source Control Chapter should be considered.

The only high priority storm drainage needs identified were the construction of the new storm sewer required to separate the catch basins on Parent Street and Butler Street.

B. Management Considerations

1. Existing Conditions

The primary responsibility for controlling storm water runoff rest with the municipality. However, where combined sewer systems are under management of a sewer district, responsibilities are shared.

2. Alternatives and Recommendations

Runoff from development can be limited by local codes and ordinances such as subdivision regulations and zoning ordinance performance standards. Additionally, the State Site Location Law requires erosion and sediment control plans for new development. The existing management agencies have adequate authority to control runoff. The Town has the authority to regulate the use of land to limit runoff and the local treatment authority has the power to control collected runoff. Therefore, no institutional changes are recommended. However, to improve controls to limit runoff municipalities are urged to review, modify and adopt the model subdivision regulations and zoning ordinance performance standards included in the Plan.

A technical review team should be funded through federal, state, and local sources, to assist the municipality in establishing ordinances and in the review of proposed developments.

C. Impact Assessment

The essential purpose of the recommended ordinances is to minimize the increase of runoff from developed lands, attempting to maintain to the extent possible the natural runoff conditions. This action will tend to eliminate storm related discharges to surface waters and reduce the potential for flooding. Controlling stormwater runoff at the source will decrease the demand for expensive collection and transport facilities.

A secondary impact of the implementation of the ordinance will be increased land development costs.

Runoff from Agriculture

A. Technical Considerations

1. Existing and Future Conditions

The land use/land cover map indicates there are about 30,000 acres in agricultural use in the 208 area (12.9% of the land area). Only 10,000 acres are under intensive farming as cropland, the rest being open pasture or hay fields. The Soil Conservation Service has estimated that 66% of the farms are operated under the guidance of Conservation Plans designed to limit soil loss from the land. Because of this, the erosion and sedimentation problems associated with agricultural land use and the potential water quality impact of runoff from these lands is considered minor for this region.

2. Alternatives and Recommendations

Structural controls to minimize agricultural runoff must be applied on a site specific basis. The Soil Conservation Service's recommended agricultural practices and controls for soil loss developed through Conservation Plans are sufficient to protect water quality in this region. Nonstructural control recommendations are in the Land Use Chapter of the Plan as locally enforced Performance Standards (see Management Considerations below).

B. Management Considerations

1. Existing Conditions

Municipalities have the authority to manage land use controls. The Saco River Corridor Commission manages the land within 1000 feet of the Saco River. Voluntary USDA programs are administered by S.C.S. and A.S.C.S. The federal programs offer technical and financial assistance to farmers to control soil loss.

2. Alternatives and Recommendations

Funding of USDA programs should be continued. Additional money should be channeled into the A.S.C.S. Program and the $2,500 cut-off per project should be raised.

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Municipalities should review, revise and adopt appropriate versions of the Model Performance Standards for control of run-off and soil loss. A technical review team should be funded by federal, state, and local sources to assist the municipality in the establishing of ordinances and in the review of proposed developments.

C. Impact Assessment

The essential purpose of the recommended ordinances is to minimize the increase of runoff from agricultural lands attempting to maintain to the extent possible the natural runoff conditions. This action will tend to eliminate storm related discharges to surface waters and reduce the potential for flooding.

A secondary impact of the implementation of these ordinances will be increased costs of agricultural land use.

Salt Storage and Application

A. Technical Considerations

1. Existing and Future Conditions

Salt (sodium chloride) is used in Southern Maine to achieve bare pavement conditions during the winter months. Salt will continue to be used as long as the bare pavement policy is mandated and other highway de-icing chemicals are not used because of their prohibitive cost. Surface water quality problems have not been associated with highway de-icing salt uses. However, a small number of individual water supplies have been found to exceed chloride standards.

2. Alternatives and Recommendations

Since use of highway de-icing salt compounds will continue, general guidelines have been presented for the storage, handling and application of these compounds. These guidelines are sensitive to the conflicting policies of bare pavements in winter and clean water and attempt to strike a balance between the two.

B. Management Considerations

1. Existing Conditions

The State and municipalities have the authority and responsibility to maintain roads and highways in the region. The State has established guidelines and procedures for highway de-icing salt storage and application, and has developed educational and training programs for local operators.

2. Alternatives and Recommendations

Existing Maine laws should be investigated for enforcement powers related to regulate the use of highway de-icing compounds. In the absence of enforceable regulations and state level standards adequate for protection of the environment and compatible with policies related to winter driving conditions, MDEP, MDOT and the other agencies should collaborate on their development. This program development should in-

clude a series of checks and balances through required reporting, surveillance and/or sampling, and analysis.

C. Impact Assessment

Continued use of highway de-icing salt for road maintenance in the winter months will present a potential threat to surface and groundwater quality. Following recommended practices for storage and application of the salt will minimize the potential for water quality degradation while maintaining bare pavement policy. These practices may tend to increase the costs of providing facilities for salt storage; however, costs may be partially offset by the resulting conservation of salt.

Runoff from Construction Activities

A. Technical Considerations

1. Existing and Future Conditions

Because of the need to remove the cover vegetation and leave areas exposed during many construction projects, the potential for erosion and sedimentation is great. The soil loss can be extensive and can result in significant degradation of surface water through sedimentation and siltation. Since population projections indicate continued growth and development, construction activities will remain a potential source of water pollution.

2. Alternatives and Recommendations

Since erosion and sedimentation in the study area is principally site specific, each situation or occurrence must be considered in relationship to its own setting. The two major factors to be considered in erosion and sediment control are:

a. Reduction of the raindrop impact energy which reduces its dispersing and eroding power below the critical force and

b. Reduction of the velocity of the surface runoff which, in turn, lessens its abrading power and transporting capacity.

Probably the most effective method of reducing the impact energy of raindrops are those procedures which cover the soil; e.g., natural plant cover, mulching, temporary cover crops and paving or covering with non-erodable materials. If the precipitation falling on the site is not allowed to pick up velocity as it runs off then its erosive power is curtailed. Shortening the length of slope is one of the most effective methods of controlling runoff velocities. This shortening can be accomplished by various techniques such as structural measures, cropping or management patterns, or tillage practices.

It is recommended that the most cost-effective manner of instituting methods for controlling runoff from construction activities is through local land use regulatory controls.

B. Management Considerations

1. Existing Conditions

Construction controls are implemented at all levels. The Federal government imposes controls through the Federal Highway Administration and the Corps' activities. The State imposes controls through the Site Location Law, the Great Ponds Law, and Wetlands Act, Stream Bulldozing, and Mandatory Shoreland Zoning. The Saco River Corridor Commission imposes controls on construction activities. Local controls are imposed through subdivision and zoning regulation.

2. Alternatives and Recommendations

Since the requisite legal authority to regulate construction activities exists, no institutional change is recommended. Municipalities should review, revise, and adopt appropriate versions of the Model Performance Standards for control of runoff and soil loss.

A technical review team should be funded by Federal, State, and local sources to assist the municipality in the establishment of ordinances and in the review of proposed developments.

C. Impact Assessment

The essential purpose of the recommended ordinances is to minimize the increase of runoff from agricultural lands, attempting to maintain to the extent possible the natural runoff conditions. This action will tend to eliminate storm related discharges to surface waters that may adversely affect water quality.

A secondary impact of the implementation of these ordinances could be increased costs for agricultural activities.

Petroleum Storage and Transfer

A. Technical Considerations

1. Existing and Future Conditions

From the evidence there is no question that petroleum products have the potential to contaminate water resources in the SMRPC 208 area. Furthermore, with the potential for more than 31 million gallons of #2 homeheating fuel transferred in over 150,000 transactions and with over 16 million gallons of storage capacity within the 208 area, substantial opportunity for similar oil pollution will continue to exist for the foreseeable future. Assuming little change in present technological and other controls, spills and leaks will likely culminate in local long-term environmental degradation with little or no opportunity for corrective action.

Boating activity (specifically exhaust emissions) may not cause major adverse effects on lakes; however, support facilities (e.g., marinas selling oil and fuel and doing repair work), accidents, and negligence in the handling of petroleum products may degrade water quality.

2. Alternatives and Recommendations

This planning effort did not address the large amount of technical control methods for the handling and distribution of petroleum products.

B. Management Considerations

1. Existing Conditions

Petroleum storage and transfer are currently managed by Federal, State and local governments. The Federal and State governments primarily regulate water transport, large on-land storage facilities, and discharge to groundwaters and surface waters. Local governments have the authority to control the siting of oil storage facilities adjacent to water bodies.

2. Alternatives and Recommendations

A State level program designed to identify the magnitude of petroleum related pollution should be developed. Applicable controls should be recommended and incorporated into legislative and regulatory programs. Local and regional input should be sought by the State in the design and implementation of the program.

C. Impact Assessment

As long as substantial volumes of petroleum products are handled, stored, transferred and consumed in the SMRPC 208 area, contamination of water resources is likely to continue. Assuming little change in present technological and management controls, spills and leaks will likely culminate in local long-term environmental degradation with little or no opportunity for corrective action. However, a state level program designed to improve the handling of petroleum products will minimize the potential for petroleum related pollution in Maine.

SOUTHERN MAINE REGIONAL PLANNING COMMISSION
AREAWIDE WASTE TREATMENT MANAGEMENT PLAN

IMPACT ASSESSMENT MATRIX
SOUTH BERWICK

LEGEND

- ■ VERY NEGATIVE
- □ NEGATIVE
- □ NO IMPACT
- ■ POSITIVE
- ■ VERY POSITIVE

FACTORS IMPACTED — NATURAL FACTORS: LAND (1–2), SURFACE WATERS (3–11), GROUNDWATER (12–17), AIR (18–21), FLORA (22–24), FAUNA (25–28); CULTURAL FACTORS: LAND USE (29–33), Recreation (34–35), SOCIAL (36–40), ECONOMIC (41–44); COST COMPARISON (45–46)

1 SOIL; 2 UNIQUE PHYSICAL FEATURES; 3 DISSOLVED OXYGEN; 4 BIOLOGICAL OXYGEN DEMAND; 5 SUSPENDED SOLIDS; 6 NUTRIENTS; 7 DRINKING WATER SUPPLY; 8 TEMPERATURE; 9 TURBIDITY; 10 BACTERIA & VIRUSES; 11 Toxic Substances & Heavy Metals; 12 CHLORIDES; 13 NITRATES; 14 PHOSPHATES; 15 HEAVY METALS; 16 BATERIA & VIRUSES; 17 DRINKING WATER SUPPLY; 18 PARTICULATES; 19 NITROGEN OXIDES; 20 SULFUR OXIDES; 21 TOXIC SUBSTANCES; 22 NATURAL VEGETATION; 23 MANAGED VEGETATION; 24 AQUATIC VEGETATION; 25 BIRDS; 26 LAND ANIMALS; 27 FISH & SHELLFISH; 28 FOOD CHAINS; 29 Open Space, Wetlands, Forest; 30 AGRICULTURAL; 31 RESIDENTIAL; 32 COMMERCIAL; 33 INDUSTRIAL; 34 FISHING; 35 WATER RECREATION; 36 POPULATION GROWTH; 37 DEVELOPMENT PATTERN; 38 EMPLOYMENT; 39 HEALTH & SAFETY; 40 INSTITUTIONS; 41 WATER SUPPLY; 42 RECREATION; 43 FISHING; 44 MANUFACTURING; 45 CAPITAL COST; 46 Operation/Maintenance Cost

WASTE SOURCES — TECHNICAL & MANAGEMENT ALTERNATIVES

Section	Group	Alternative	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46
SEWAGE DISPOSAL COLLECTION & TREATMENT SYSTEMS	Treatment Alternatives	NO ACTION																																														
		NEW SECONDARY TREATMENT FACILITY			■	■	■	■			■	■																	■	■			■	■	■			■	■	■	■					■		
	Regional Alternatives	TO BERWICK			■	■	■	■			■	■																	■	■			■	■	■			■	■	■	■					■	■	
		TO SOMERSWORTH			■	■	■	■			■	■																	■	■			■	■	■			■	■	■	■					■	■	
	Sewer Extensions	TO MARSHWOOD JUNIOR HIGH SCHOOL			■	■	■	■			■	■																	■	■			■	■	■			■	■	■	■							
	Management Alternatives	USE EXISTING AUTHORITY																																														
		DEVELOP NEW AUTHORITY																																								■						
SEWAGE DISPOSAL SUBSURFACE SYSTEMS	Treatment Disposal Systems	SUBSURFACE WASTE DISPOSAL																															■	■				■			■							
		ALTERNATIVE TOILETS													■	■		■	■						■								■	■				■			■							
		SEWER EXTENSIONS													■	■		■	■														■	■	■			■	■	■	■					■	■	■
	Management Alternatives	USE EXISTING AUTHORITY																																														
		STRICT CODE ENFORCEMENT													■	■		■	■												■					■	■				■							
		MAINTENANCE PROGRAM													■	■		■	■																	■	■				■							
		REGIONAL CODE MANAGEMENT																																														■
SEPTAGE DISPOSAL	Disposal Methods	NO ACTION																																														
		TREATMENT PLANT																																														
		LAND APPLICATION																																														
		INCINERATION																																														
	Management Activities	USE EXISTING AUTHORITY																																														
		REGIONALIZATION																																														
SLUDGE DISPOSAL	Disposal Methods	NO ACTION	■												■	■		■	■																						■							
		LAND APPLICATION																																														
		INCINERATION	■												■	■		■	■																												■	■
		COMPOSTING	■																					■	■																							
	Management Alternatives	USE EXISTING AUTHORITY																																														
		REGIONALIZATION																																													■	■
SOLID WASTE DISPOSAL	Disposal Methods	NO ACTION	■								■	■		■	■	■	■	■													■																	
		SOURCE SEPARATION	■								■	■		■	■	■	■	■													■									■						■		
		BAILING OR SHREDDING																																													■	
		INCINERATION	■								■	■		■	■	■	■	■													■															■	■	■
		INCINERATION WITH HEAT RECOVERY	■								■	■		■	■	■	■	■													■															■	■	
		SANITARY LANDFILL																																														
	Management Alternatives	USE EXISTING AUTHORITY																																														
		REGIONALIZATION																																													■	■

APPENDIX

GLOSSARY

abrade - to rub off; to wear away by friction.

advanced waste treatment - waste water treatment beyond the secondary or biological stage that includes removal of nutrients such as phosphorous and nitrogen and a high percentage of suspended solids. Advanced waste treatment, known as tertiary treatment, is the "polishing stage" of waste water treatment and produces a high quality effluent.

aeration - the process of being supplied or impregnated with air. Aeration is used in waste water treatment to foster biological and chemical purification.

aerobic - this refers to life or processes that can occur only in the presence of oxygen.

algal bloom - a proliferation of living algae on the surface of lakes, streams or ponds. Algal blooms are generally stimulated by phosphate enrichment.

anaerobic - refers to life or processes that occur in the absence of oxygen.

aquifer - an underground bed or stratum of earth, gravel or porous stone that contains water.

Areawide Policy Advisory Committee - APAC, the regional citizen advisory committee.

bacteria - single-celled microorganisms that lack chlorophyll. Some bacteria are capable of causing human, animal or plant diseases, others are essential in pollution control because they break down organic matter in the air and in the water.

base level technology - minimum level of treatment required by the Clean Water Act.

Best Available Technology - (BAT) National effluent standards not yet defined for all point sources which should be applied by 1983.

Best Management Practice - (BMP) That combination of technical measures and management arrangements that best meets a water quality goal. Often referred to in discussions of the management of nonpoint sources of pollution.

Best Practicable Control Technology - (BPCT) is a set of national technologically based effluent standards for existing industrial point sources promulgated by the Administrator for all standard industrial classifications (SIC). The standards take into account the age of industrial plant and the variations in production processes within an SIC category. BPCT is to be achieved by July 1, 1977. Actual numerical standards vary from industry to industry.

Best Practicable Treatment or Best Practicable Waste Treatment Technology - (BPT or BPWTT) is called for by the Act (Section 201). BPT (or BPWTT) is a national technological effluent standard applied to municipalities. All municipal point source discharges must comply with BPT by July 1, 1977. The standards, promulgated by the Administrator, allow for:

30 day arithmetic mean		7 day mean	
BOD (5 day)	30 mg/l	45 mg/l	85% removal
Suspended Solids	30 mg/l	45 mg/l	85% removal

30 day geometric mean		7 day mean
Fecal Coliform	200/100 ml	400/100 ml
pH	6-9	

Biochemical Oxygen Demand - (BOD) a measure of the amount of oxygen consumed in biological processes that decompose organic matter in water. Large amounts of organic waste use up large amount of dissolved oxygen, thus the greater the degree of pollution, generally, the greater the BOD. The expression BOD_5 refers to the amount, in pounds, of dissolved oxygen consumed in 5 days by biologic processes decomposing organic matter in water.

biodegradable - the act of decomposing quickly as a result of the action of microorganisms.

chlorination - the application of chlorine to drinking water, sewage or industrial waste for disinfection or oxidation of undesirable compounds.

chlorophyl a - one of the photosynthetic pigments that plants require to convert carbon dioxide and sunlight into oxygen and sugars. It is measured in parts per million.

coliform bacteria - several groups of bacteria common to the intestinal tract of warm blooded animals. Since they are found in the feces of such animals, including man, their presence in water samples indicate fecal contamination, a potentially dangerous threat to public health.

combined sewers - see "sewers".

composting - a controlled process of degrading organic matter by microogranisms. (1) mechanical - a method in which the compost is continuously and mechanically mixed and aerated. (2) ventilated cell - compost is mixed and aerated by being dropped through a vertical series of ventilated cells. (3) windrow - an open-air method in which compostible material is placed in windrows, piles or ventilated bins or pits and occasionally turned or mixed. The process may be anaerobic or aerobic.

discharge of pollutants - "The term 'discharge of a pollutant' and the term 'discharge of pollutants' each mean any addition of any pollutant to the waters of the contiguous zone or the ocean from any point source other than a vessel or other floating craft." (Act, Sec. 502 (12)).

dissolved oxygen - (DO) the oxygen dissolved in water that is available to plants and animals. Adequate amounts are necessary to provide a healthy environment for fish and to aid the decomposition of organwastes. Excessive amounts may indicate too much plant life or eutrophication. Measured in milligrams per liter (mg/l). Full saturation is 9.2 mg at temperature of 20 C.

effluent - a discharge of pollutants into the environment, partially or completely treated or in its natural state. Generally used in regard to discharges into waters.

effluent limitation - "The term 'effluent limitation' means any restriction established by a State or the Administrator of the US EPA on quantities, rates, and concentrations of chemical, physical, biological, and other constituents of chemical, physical, biological, and other constituents which are discharged from point sources into navigable waters, the waters of the contiguous zone, or the ocean, including schedules of compliance." (Act, sec. 502(11)).

erosion - the wearing away of the land surface by wind or water. Erosion occurs naturally from weather or runoff but is often intensified by man's land-clearing practices.

estuaries - areas where the fresh water meets salt water. For example, bays, mouths of rivers, salt marshes and lagoons. Estuaries are delicate ecosystems; they serve as nurseries, spawning and feeding grounds for a large group of marine life and provide shelter and food for birds and wildlife.

eutrophication - the normally slow aging process by which a lake evolves into a bog or marsh and utlimately assumes a completely terrestrial state and disappears. During eutrophication the lake becomes so rich in nutritive compounds, especially nitrogen and phosphorous, that algae and other microscopic plant life become superabundant, thereby "choking" the lake, and causing it eventually to dry up. Eutrophication may be accelerated by many human activities.

facilities planning - pertains to "provision for cost effective, environmentally sound and implementable treatment works which will meet applicable requirements of sections 201 (g), 301, and 302 of the Act." (Regulations, 40 CFR part 131).

fecal coliform bacteria - (FC) a group of organisms common to the intestinal tracts of man and of animals. The presence of fecal coliform bacteria in water is an indicator of pollution and of potentially dangerous bacterial contamination.

groundwater - the supply of fresh water under the earth's surface in an acquifer or soil that forms the natural reservoir for man's use.

hydrology - the science dealing with the properties, distribution and circulation of water and snow.

infiltration - "The water entering a sewer system, including sewer service connections, from the ground, through such means as, but not limited to, defective pipes, pipe joints, connections, and manhole walls." (40 CFR 35.905-9).

inflow - water entering a sewer system from storm drains, catch basins, cellar drains, roof leads or other sources directly connected to the sewer system.

interceptor sewers - see "sewers".

lagoon - in waste water treatment, a shallow pond usually man-made where sunlight, bacterial action and oxygen interact to restore waste water to a reasonable state of purity.

land use - the physical mode of utilization or conservation of a given land area at a given point in time.

land use controls - methods for regulating the uses to which a given land area may be put, including such things as zoning, subdivision regulation, and flood plain regulation.

lateral sewers - see "sewers".

leachate - liquid that has percolated through solid waste or other mediums and has extracted dissolved or suspended materials from it.

limiting factor - those elements whose availability determines the limits of growth. Generally in Maine lakes the limiting factor for algal growth is phosphorous.

limnology - the study of the physical, chemical, meteorological and biological aspects of fresh waters.

materials balance - an illustration of the principle of conservation of matter; that is, an accounting may be performed of all transfers of mass from one point or state to other points or states, such that the total original mass is entirely accounted for.

maximum daily load - that load of pollutants, including thermal measurements that is allowable for each specific criterion being violated or expected to be violated on water quality segments.

navigable waters - "The term 'navigable waters' means the waters of the United States, including the territorial seas". (Act, sec. 502(7)).

1983 goals - pertains to goals outlined in sec. 101(a) and elsewhere in the Act with emphasis on making waters swimmable and fishable wherever attainable.

nitrogenous wastes - wastes of animal or plant origin that contain a significant concentration of nitrogen.

nonpoint source - (NPS) diffuse sources of pollution, usually not associated with a structure such as an effluent pipe or sewer drain.

nutrients - elements or compounds essential as raw materials for organism growth and development; for example, carbon, oxygen, nitrogen and phosphorous.

oligotrophic lakes - deep lakes that have a low supply of nutrients and thus contain little organic matter. Such lakes are characterized by high water transparency and high dissolved oxygen.

outfall - the mouth of a sewer, drain or conduit where an effluent is discharged into the receiving water.

oxidation pond - a man-made lake or pond in which organic wastes are reduced by bacterial action. Often oxygen is bubbled through the pond to speed the process.

package plant - a prefabricated or prebuilt waste water treatment plant.

pathogenic - causing or capable of causing disease.

phosphorous - (P) an element that while essential to life, contributes to the eutrophication of lakes and other bodies of water. It is measured in mg/l.

point source - in water pollution, a stationary wastewater discharge, usually from an industrial or municipal facility.

pretreatment - in waste water treatment, any process used to reduce pollution load before the waste water is introduced into a main sewer system or delivered to a treatment plant for substantial reduction of the pollution load.

primary treatment - the first stage in wastewater treatment in which substantially all floating or settleable solids are mechanically removed by screening and sedimentation.

pumping station - a station at which sewage is pumped to a higher level. In many sewer systems pumping is unnecessary, since waste water flows by gravity to the treatment plant.

raw sewage - untreated domestic or commercial waste water.

receiving waters - rivers, lakes, oceans or other bodies that receive treated or untreated waste waters.

residual waste - solids removed from waste water during treatment.

river basin - the total area drained by a river and its tributaries.

runoff - the portion of rainfall, melted snow or irrigation water that flows across ground surface and eventually is returned to streams. Runoff can pick up pollutants from the air or the land and carry them to the receiving waters.

Secchi disc - an 8 inch disc painted in black and white quarters used to measure water transparency or visibility in units or length - usually meters.

secondary treatment - waste water treatment, beyond the primary stage, in which bacteria consume the organic parts of the wastes. This biochemical action is accomplished by use of trickling filters or the activated sludge process. Effective secondary treatment removes virtually all floating and settleable solids and approximately 90 percent of both BOD_5 and suspended solids. Customarily disinfection by chlorination is the final stage of the secondary treatment process.

sedimentation - a process in water in which solids settle by gravity.

septage - liquid and solid material pumped from a septic tank or cesspool during cleaning.

septic tank - an underground tank used for the deposition of domestic wastes. Bacteria in the wastes decompose the organic matter, and the sludge settles to the bottom. The effluent flows through drains into the ground. Sludge is pumped out at regular intervals.

settleable solids - bits of debris and fine matter heavy enough to settle out of waste water.

sewage - the total or organic waste and waste water generated by residential and commercial establishments.

sewer - any pipe or conduit used to collect and carry away sewage or storm-water runoff from the generating source to treatment plants or receiving streams. A sewer that conveys household and commercial sewage is called a sanitary sewer. If it transports runoff from rain or snow, it is called a storm sewer. Often storm water runoff and sewage are transported in the same system or combined sewers.

collector sewers - major public sewers that carry flows from laterals to interceptors.

combined sewers - a sewerage system that carries both sanitary sewage and storm water runoff. During dry weather, combined sewers carry all waste water to the treatment plant. During a storm, only part of the flow is intercepted because of plant overloading; the remainder goes untreated to the receiving stream.

lateral sewers - pipes running underground that collect sewage from homes or businesses to the public collector system.

interceptor sewers - sewers used to collect the flows from main and trunk sewers and carry them to a central point for treatment and discharge. In a combined sewer system, where street runoff from rains is allowed to enter the system along with sewage, interceptor sewer overflow structures allow some of the sewage to flow untreated directly into the receiving stream, to prevent the treatment plant from being overloaded.

storm sewers - conduits that collect and transport rain and snow runoff to the surface waters. In a separate sewerage system, storm sewers are entirely separate from those carrying domestic and commercial waste-water.

sewerage - the entire system or sewage collection, treatment and disposal. Also applies to all effluent carried by sewers whether it is sanitary sewage, industrial wastes or storm water runoff.

sludge - solids removed from sewage during waste water treatment. Sludge disposal is then handled by incineration, dumping, composting, burial, or agricultural use.

solid waste - useless, unwanted or discarded material with insufficient liquid content to be free flowing.

State water quality standards - standards of water quality set by the State for intrastate waters, that shall be at least as stringent as Federal standards and shall further the goals of the Act.

suspended solids - (SS) small particles of solid pollutants in sewage that contribute to turbidity and that resist separation by conventional means. The examination of suspended solids and the BOD test constitute the two main determinations for water quality performed at waste water treatment facilities.

tertiary treatment - waste water treatment beyond the secondary, or biological stage that includes removal of nutrients such as phosphorous and nitrogen, and a high percentage of suspended solids. Tertiary treatment, also known as advanced waste treatment, produces a high quality effluent.

thermal pollution - degradation of water quality by the introduction of a heated effluent. Primarily a result of the discharge of cooling waters from industrial processes, particularly from electrical power generation. Even small deviations from normal water temperatures can affect aquatic life. Thermal water pollution usually can be controlled by cooling towers or using the waste heat for local heating needs.

topography - the configuration of a surface area including its relief or relative elevations, and the position of its natural and man-made features.

Trophic Status Index - (TSI) a relative index of eutrophication used as a general guide to the quality of a given lake compared to similar lakes. 100 indicates oligotrophic and 0 is eutrophic.

upstream pollutant source - source of pollutants discharged into the receiving waters which is located upstream from the area of consideration.

urban runoff - storm water from city streets and gutters that usually contains a great deal of litter and organic and bacterial wastes.

variance - sanction granted by a governing body for delay or exception in the application of a given law, ordinance or regulation.

waste load allocation - a waste load allocation for a segment is the assignment of target loads to point and nonpoint source so as to achieve water quality standards in the most effective manner. Allocations are used for water quality limited segments for which standard pollution control measures will not achieve the desired water quality. The greater levels of treatment are assigned in the allocation.

waste treatment facilities - "Any devices and systems used in the storage, treatment, recycling and reclamation of municipal sewage or industrial wastes of a liquid nature...in additon, ... any other method or system for preventing, abating, reducing, storing, treating, separating, or disposing of municipal waste, including waste in combined storm water and sanitary sewer systems." (Act sec. 212(2)). Also termed treatment works.

water quality limited segments - "Any segment where it is known that water quality does not meet water quality standards even after the application of the effluent limitations required by sections 301(b) (A) and 301(b) (1) (B) of the Act." (Regulations 40 CFR part 131).

watershed - the area drained by a given stream.

ac. - acre

Act - P.L. 92-500. The Clean Water Act Amendments of 1972.

APAC - Areawide Policy Advisory Committee.

ASCS - United States Agricultural Stabilization Conservation Service

BOG - Bureau of Geology, Maine Department of Conservation

CAP - Community Action Program

CBD - Central Business District

cfs - cubic feet per second

cm - centimeter

CZM - Coastal Zone Management

COLA- Congress of Lake Associations

exponent^3 - cubic

CFSM - cubic feet per second per mile

da. - day

DMS - Data Management System

DOC - Department of Conservation

DEP - Maine's Department of Environmental Protection. Also referred to as MDEP.

DMR - Department of Marine Resources

DOT - Maine's Department of Transportation. Also referred to as MDOT.

gpd - gallons per day

gmp - gallons per minute

gph - gallons per hour

g - gram

ECJ - Edward C. Jordan Company

EPA - United States Environmental Protection Agency

FHWA - Federal Highway Administration

FmHA - Farmers' Home Administration

kg. - kilogram

km. - kilometer

MACC - Maine Association of Conservation Commissions

MG - million gallons

MGD - million gallons per day

MLSS - mixed liquour suspended solids

MPN - most probable number

MSWCC - Maine Soil and Water Conservation Commission

m - meter

mg - microgram

mi. - mile

meg/100 g - milliequivalent

mg - milligram

mm - millimeter

mg/l - milligrams per liter

ml - milliliter

N - nitrogen

NOAA - National Oceanic and Atmospheric Administration

NERBC - New England River Basin Commission

oz. - ounce

P - phosphorous

ppm - parts per million

SCS - United States Soil Conservation Service

sec. - second

SMRPC - Southern Maine Regional Planning Commission

SPO - State Planning Office

SS - suspended solids

TC - Total Coliform (see coliform bacteria)